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Vat Dyeing Piece Goods

Customers' Samples Must Be Matched To-day—Three Fundamental Methods—A Specific Jig Procedure to Meet Conditions—Typical Procedures—The Easiest Method—Padding and Reducing on the Jig—Saving Minutes

By ORMOND W. CLARK

THE demand for fast-dyed fabrics has continually increased; although, due in part to the disposition of many concerns to sell as fast dyed, fabrics whose colors do not justify the appellation, with a consequent distrust of fast color sales talk by the ultimate consumer, and due in part to the technical difficulties accompanying the processes of fast-color dyeing, the consumption of vat-dyed fabrics has not attained the volume warranted by their unquestionably better money value. It is a slow process to educate the public correctly to discriminate between fast colors that are really fast and those that are only fast in the imagination of glib salespeople.

The technical aspects of the dyeing of vat colors on piece goods, due to the perfection of the commercial types of vat dyes, the wide dissemination of accurate data and practical methods of dyeing by the progressive dye manufacturers, and the influx of technically trained men into the textile industry, have lost much of the uncertainty which previously often tested the courage of those who ventured to dye the vat colors on piece goods.

Some years ago nearly all the vat dyeing was to a standard line of shades. To-day much of the vat dyeing is to customers' samples. While not every desire of the customer with respect to brilliancy is possible of fulfillment with the accompaniment of guaranteed all-around fastness, yet the range of shades which can be produced is quite wide and rapidly the number of dyes of requisite fastness is being augmented as a result of intensive research by the dye manufacturers. The practical production of close matches to customers' samples is an exacting task in spite of the progress which has been made in vat dyeing.

The prerequisites for the successful vat dyeing of piece goods to customers' shades are:

1. Thorough knowledge of and familiarity with the dyes selected as the basis of the shades.

2. Thorough experience with the various methods of applying vat dyes to piece goods.

3. Ability to maintain production rate and quality of work at a profitable level.

4. Resourcefulness in successfully meeting the exigencies which arise in practical production.

5. Constant endeavor to raise the quality of work and to lower costs.

If the knowledge of vat dyes is to be fundamentally sound, a large amount of careful laboratory work must contribute to this end. The information derived from manufacturers' color cards is helpful as a guide, but is no substitute for personal investigation. Data on color cards may be somewhat optimistically evaluated or may be based on depths of shade or methods of dyeing which do not correspond to the practice in a specific plant. Tests of the behavior of the dyestuffs in various compositions of dye baths and at various temperatures show the limits between which the optimum conditions may be varied to meet practical requirements.

Three Fundamental Methods of Vat Dyeing

The dyer of vat colors soon realizes that his knowledge of their practical application exists in a status far from static. Minute details do not disclose their full significance at once. Only gradually does one comprehend and clearly envision their complete import. The introduction of different fabric constructions or the requirements of specific fibers may necessitate a complete revision of the usual dyeing processes and a careful search for the optimum conditions to produce level, well-penetrated shades.

The three fundamental methods of vat-dyeing piece goods are jig dyeing, padding with reduced vat dyestuff, and padding with unreduced vat dyestuff with a subsequent passage of the cloth through a reducing process

As a rule, two, or sometimes all three, of these methods are used in the same plant.

The jig dyeing of vat colors requires strict attention to details, rigid control of all conditions, and a well-trained personnel. Properly conducted, it is very economical of dyestuff, and on fabrics for which this method is well suited the resultant shades are extremely fast, with a reasonable production cost. Some types of fabric do not readily lend themselves to jig dyeing. For instance, the broadcloth construction, tightly woven of hard twisted yarns, is prone to develop two-sidedness, heavy selvedges, seam mark-offs, streakiness, and similar undesirable characteristics. Certain dyestuffs are extremely difficult to dye level on the jig; the important blues, unfortunately, belonging to this category. When the limitations of jig dyeing are thoroughly understood and it is confined to the proper fabrics and to the suitable dyestuffs, it becomes a valuable method, to be supplemented by the other dyeing processes.

The cloth must be uniformly and thoroughly prepared, free from residual chemicals from the previous treatments. Care in the preparation of the cloth, to insure thoroughness without the slightest excess of treatment, is distinctly worth while. For light and medium shades the cloth should be well boiled out, preferably mercerized, and lightly bleached. It must be delivered to the dyer in rolls with coincident selvedges, these rolls being tenter-wound if necessary. The seams should be as narrow as possible, free from pucker, preferably double-stitched, flat seams. The size of the rolls will vary with the specific plant conditions, but roughly will range from 1,200 yards of 12-yard organdy to 400 yards of 2-yard drapery.

The jigs used for vat dyeing must be in excellent mechanical condition. The box should be of metal, iron or Monel to resist the action of the dye bath and the subsequent baths and to facilitate cleansing by preventing the absorption of dyestuff. The rolls and beams should preferably be rock-hard rubber, with Monel a second choice, absolutely parallel and true running. Pipes and fittings should be cast iron or Monel. Extra large supply pipes and extra large drains minimize loss of time between ends and minimize oxidation of the selvedges by shortening the time which the rolls must swing between ends. When the expense is not considered excessive, the installation of temperature controls removes one variable from jig dyeing.

Lot 684 Yds. 1000 Operator #7			
Shade Navy			
Formula	#1	#2	#3
Blue GD Paste	5.0		
Blue BO Paste	10.0		
Yellow G Paste	0.3	0.2	
Hydro	4.0	0.5	
Caustic	5.0	0.5	
Oil	---	---	
Temp.	140	140	
Dyebath			
Caustic	2.5		
Hydro	1.0		
Ass't.			
Soda	2.0		
Salt	---		
Temp.	140		

Lot 684 Yds. 1000 Operator #7						
Shade Navy Wet out thru bath						
End	Dye	Hydro	Salt	Soap	Soda	Acetic
1	1/2	1				
2	1/2	1				
3		1				
4		1				
5		1				
6		1				
7	1/2	1				
8	1/2	1				
9		1				
10		1				
11	Cold	water				
12	Cold	water				
13	Air					
14	Air					
15			212°F			2 qt.
16			212°F			
17	Hot	water				
18		212°F		2	2	
19		"				
20		"				
21		"				
22		"				
23		"				
24	Hot	water				
25	Hot	water				
26	Shell	hot				

A Typical Procedure Card

A Specific Jig Procedure to Meet Conditions

Each vat dyer has his own jig procedure developed to meet specific conditions in his own plant, such procedure being technically sound and practically successful for

those specific conditions, although perhaps if an impartial authority could scan all the processes in use and critically analyze them there might be evolved a resultant process superior to any individual. One dyer may use only paste dyes and another may as successfully use powder dyes. One dyer may use oil to paste up his dyes and another may use some other assistant, and both may secure perfect vatting of the dyestuff. One dyer may run his jig beams at 45 revolutions per minute and another at 70. One dyer may dye all cold dyeing colors at a certain temperature and all the rest of the colors at some one other temperature. Another dyer may use only one dye-bath temperature for all colors, and another may use several temperatures differing for each class into which he has allocated specific dyes. The compositions of dye baths which are used vary widely; probably each composition is the result of individual experimentation under the conditions prevailing in a given plant. One dyer may add the color to the bath in two ends and another in four ends. The dyer may attempt to obtain his shade in three ends, four ends, five ends, six ends, or even more. One dyer may oxidize with sodium bichromate and acetic acid, another may oxidize with sodium perborate, and another dyer may run the goods through an empty jig to oxidize the goods before souring to remove the residual caustic. The development may be completed with soap and soda ash or with soap alone.

The above illustrative list of some possible variations in procedure might suggest that each dyer, without rime or reason, chose his own method apart from theoretical considerations, but only the vat dyer of much practical experience can realize the beneficial effect which a slight variation in procedure can exert under specific conditions, or can judge what circumstances render a procedure amenable to change.

TYPICAL JIG DYEING PROCEDURES

Stock Vat	Lb.
Newport Jade Green Supra Paste	1.0
Indanthrene Yellow 3GF Paste	1.0
Dry caustic soda	1.0
Hydrosulphite	1.0

Reduced twenty minutes at 140° F. in 4 gallons.
Strained through fine cloth.
One thousand yards equals 100 pounds voile.

Dye bath: 80 gallons at 110° F.

	Lb.
Dry caustic	5
Nekal BX Dry	1
Hydrosulphite	1½

Stock Vat	Lb.
Ponsol Olive AR Powder	0.1
Ponsol Brown AR Powder	0.1
Dry caustic soda	1.0
Hydrosulphite	1.0

Reduced twenty minutes at 140° F. in 4 gallons.
Strained through fine cloth.
One thousand yards equals 175 pounds lawn.

Dye bath: 80 gallons at 120° F.

	Lb.
Dry caustic	5
Soda ash	2
Common salt	10
Pyridine	¼
Hydrosulphite	2

End	End
1. Wet out through bath.	1. Wet out through dye bath.
2. ½ color—1 lb. hydro.	2. ¼ color—1½ lb. hydro.
3. ½ color—1 lb. hydro.	3. ¼ color—1½ lb. hydro.
4. ..... 1 lb. hydro.	4. ¼ color—1½ lb. hydro.
5. ..... 1 lb. hydro.	5. ¼ color—1½ lb. hydro.
6. Cold water.	6. ..... 1½ lb. hydro.
7. Cold water.	7. ..... 1½ lb. hydro.
8. ½ lb. chrome—1 qt. acetic 140° F.	8. Cold water.
9.	9. Air.
10. Hot water.	10. Air.
11. Hot water.	11. 1 qt. acetic 140° F.
12. 2 lb. soap—2 lb. soda 212° F.	12. Hot water.
13.	13. 2 lb. soap—2 lb. soda.
14.	14. .....
15.	15. .....
16.	16. .....
17.	17. .....
18. Hot water.	18. .....
19.	19. Hot water.
20. Shell hot.	20. Hot water.
	21. Shell hot.

Where practice has demonstrated the feasibility, the experienced vat dyer is able to shorten these procedures. The above procedures produce excellent results, but it is possible to devise procedures which in skilful hands produce results as good and which permit the production of two rolls per jig per day, a production which is manifestly impossible if one roll requires twenty ends. For instance, on suitable goods in rolls of the proper size, procedure No. 1 might be shortened thus:

End	End
1. Wet out through bath.	8. 2 lb. soap—2 lb. soda.
2. ½ color—1 lb. hydro.	9. .....
3. ½ color—1 lb. hydro.	10. .....
4.	11. .....
5. 2 lb. chrome—2 qt. acetic.	12. Hot water.
6. Hot water.	13. Shell hot.
7. Hot water.	

This procedure permits two rolls per jig per day and, with one operator to three jigs, gives a production of six rolls per man per day.

With a thoroughly perfected procedure, much of the uncertainty in jig dyeing vat colors is shifted to the jig operators. It takes thorough training and rigid discipline to develop a skilled, dependable group of vat jig hands. To the dyer the use of the thermometer seems quite elementary, but it requires repeated drilling to train jig men properly to take the temperature of a dye bath, for they are prone to insufficiently agitate the bath and to read the thermometer before it has attained equilibrium. Mercury thermometers attain equilibrium more rapidly than spirit thermometers and are therefore to be preferred. The jig operators must be skilled in keeping the rolls of goods free from wrinkles and with coincident selvedges. They must be skilled in rapidly handling the goods between passages so as to minimize settling and oxidation. They must be neat workmen, or they will cause difficulty with dirty utensils and they may be injured by the splashing of hot caustic solutions caused by sloppy technique.

It is only by the most rigid supervision that several rolls of the same shade may be satisfactorily jig-dyed. It is very difficult to train a group of jig hands, since they are a rather poor grade of labor as a rule, accurately to follow complicated instructions, and constant checking is necessary for no diminution of care with the passage of time. Very helpful in promoting accuracy and fixing responsibility are printed formula cards and procedure cards similar to the one shown. These cards may be filed away after use with attached swatches of the finished shade.

The Easiest Method

The easiest method of dyeing vat colors is to pad on the reduced dyestuff and then to finish the goods by souring and soaping on the jigs or on a continuous range. This method of dyeing is wasteful of color and is suitable only for very light shades and for material which may be easily penetrated. The maximum fastness of the vat dyes is not secured by this method and some colors do

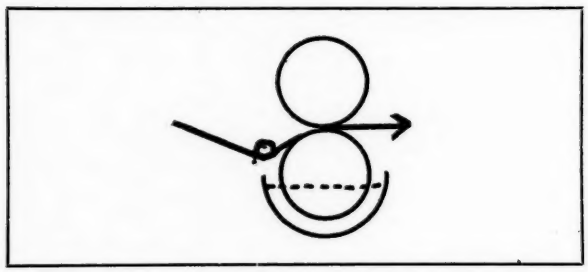


Fig. 1

not yield their true shade. High production at low cost with slight danger of seconds are the advantages of this method.

Many types of padders have been used on this work. On light open-meshed fabrics No. 1 works very well, and there is no problem of controlling the exhaustion of dyestuffs. For heavier shades and for heavier fabrics padders Nos. 2 and 3 are better. They give better penetration and are especially designed to prevent foam spots. When warranted by large production per shade a range such as Nos. 4 and 5 will reduce costs.

The dyestuff paste or powder is boiled up with water and oil until thoroughly dispersed and is then strained through fine meshed cloth. About twenty-five gallons of water is run into the padder tank, the caustic added, the dyestuff and other materials added, and the liquor is brought to the reduction temperature. The reduction proceeds until the liquor is shown to be clear when tested. The color is then brought to the desired volume at the padding temperature and the cloth is padded with the reduced color and batched into rolls for the jig or delivered to the continuous range.

The essentials of the vat padder are a small box to reduce the variation of shade during a run, a metal box to facilitate cleaning, a spray feed pipe to evenly distribute the feed liquor, some means of preventing foam spots, due to oxidized color attaching itself to the cloth, and a minimum exposure of the reduced liquor to the air. The rolls must be accurately ground and kept in perfect condition.

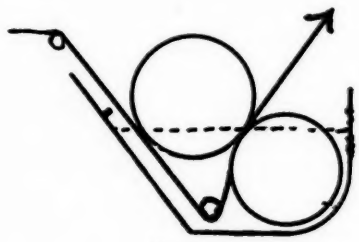


Fig. 2

Typical Formula for No. 1

	Lb.
Ponsol Orange 4R Paste	3
Dry caustic	8
Hydro	6
Fifty per cent sulphonated oil	1
Pine oil	1

100 gal. at 120° F.
125 yards per minute.

Typical Formula for No. 2 or No. 3

	Lb.
Indanthrene Brilliant Violet RK Powder	½
Dry caustic	6
Hydro	5
Glue	5
Pine oil	1

100 gal at 100° F.
60 yards per minute.

Modifications of this method have been devised to secure longer immersion in the dye liquor and so secure heavier shades and better penetration. These methods secure the high production of continuous operation and,

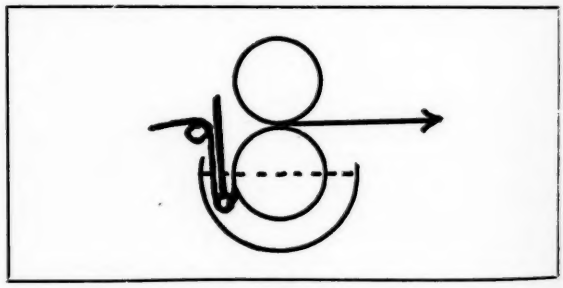


Fig. 3

when accurately controlled, lessen the possibility of seconds, but much preliminary work is necessary to establish the starting bath and feeding bath formulas for each shade. The addition of 5 pounds of sodium sulphide per 100 gallons of liquor or the addition of anthraquinone paste increases the stability of the bath and permits dyeing at lower temperatures.

Padding and Reducing on the Jig

A very useful method which combines the advantages of padding the reduced dyestuff and the advantages of

jig dyeing and which eliminates many of the disadvantages of the separate methods is to pad the cloth with the reduced dyestuff and then to run the cloth through a reducing liquor on the jig. Colors difficult to dye level on the jig or material which is difficult to penetrate are benefited by this process and the fastness of the resultant shades is that of jig dyeing. The cloth is padded with the reduced dyestuff and then batched into rolls with coincident selvedges. The wet rolls are transferred to the jig and given several passages through a reducing bath until the material is well penetrated and the bath is well exhausted of the color, which in the first few ends bled off the goods. The rolls are then oxidized and soaped

Typical Padding Formula

	Lb.
Ponsol Blue BCS Powder	5.0
Dry caustic	6.0
Glue	3.0
Hydrosulphite	6.0
Chip sodium sulphide	2.0

100 gal. at 120° F.

Jig Reduction Process

80 gal. at 120° F.

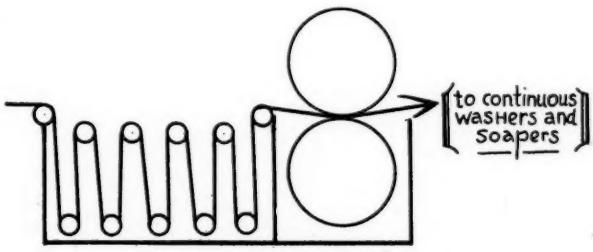
	Lb.
Dry caustic	5.0
Hydrosulphite	1.0
Nekal BX	1.0

End

1. ¾ lb. hydro.
2. ¾ lb. hydro.
3. ¾ lb. hydro.
4. ¾ lb. hydro.
5. Cold water.
6. Cold water.
7. 2 qt. acetic acid 160° F.
8. Hot water.
9. 2 qt. soap—2 qt. soda 212° F.
10. .....
11. .....
12. .....
13. Hot water.
14. Shell hot.

The pigment method has attained wide popularity. It is more foolproof than jig dyeing, gives very good penetration, and is well suited for some types of goods which are difficult to jig dye and which are dyed to a standard line of shades in large yardage per shade. It does not readily lend itself to the matching of random shades.

The unreduced dyestuff in a suitable suspension medium is padded upon the cloth, the rolls are then transferred to the jig, with or without intermediate drying, and the goods are given several passages through an alkaline hydrosulphite bath, followed by oxidizing and soaping baths. Paste dyestuffs are usually employed for this process because dye spots are liable to occur when powder dyes are used. The utmost care is necessary in preparing and straining the padding liquor. In the reduction bath the pigment dyestuff is changed to the soluble leuco compound and the true dyeing action takes place. If the padding liquor was not in the finest possible state of



Roller Vat

subdivision the particles of dye would not be acted upon with sufficient rapidity, and an unsatisfactory product would be the result.

Typical Padding Formulas

	Lb.
Indanthrene Brilliant Blue 3G Paste Fine	10.0
Dry caustic	1.0
Gum arabic 1:3	100.0
Pyridine	0.5

100 gal. at 160° F.

Ponsol Blue BR Paste	0.8
Ponsol Blue GD Paste	3.0
Ponsol Orange RRT Pst.	3.0
Dry caustic	1.0
Dextrine 1:1	200.0
Nekal BX	5.0

100 gal at 160° F.

Reduction Process

600-yard roll—3 yards per lb.

80 gal. at 120° F.

	Lb.
Dry caustic	3.0
Soap	0.25
Sodium sulphide	2.0

End

1. 1½ lb. hydro.
2. 1½ lb. hydro.
3. .....
4. 1½ lb. hydro
5. .....
6. .....
7. Cold water.
8. Cold water.
9. 2 qt. acetic at 160° F.
10. Hot water.
11. Shell hot.

Rope soap 30 min. at 212° F.

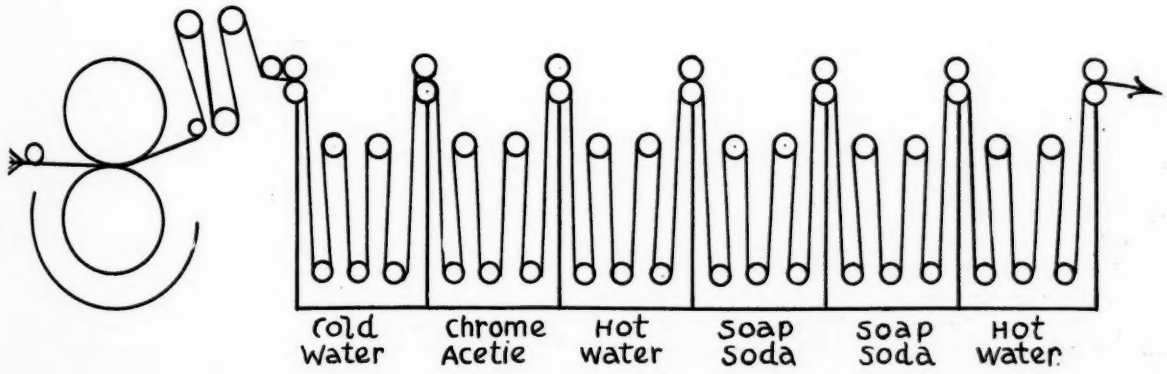


Fig. 4

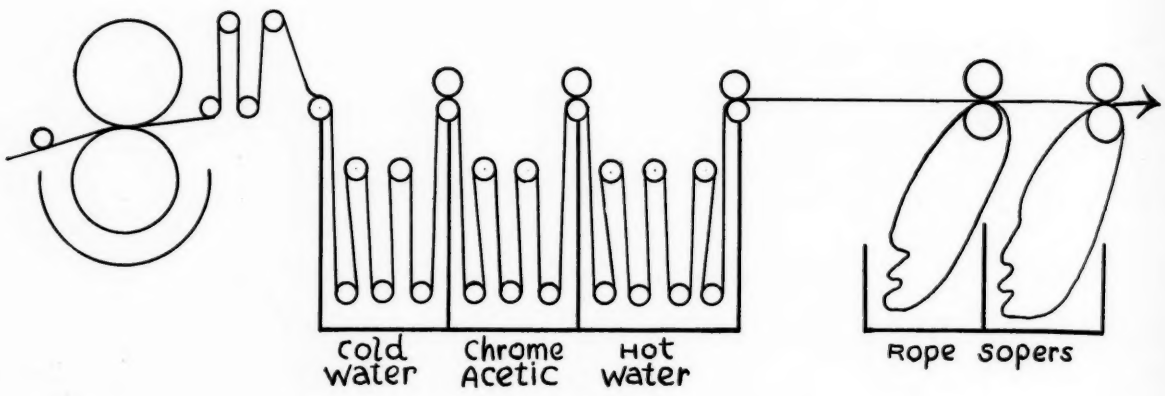
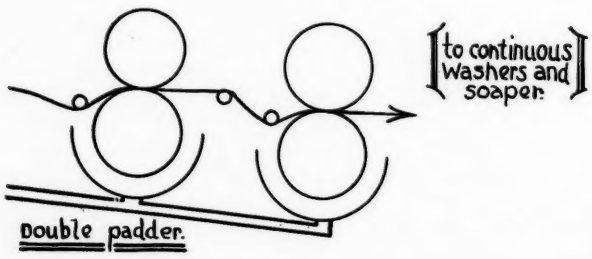


FIG. 5

When the vat dyer has developed a satisfactory set of procedures and has trained a crew of dependable operators, his attention turns to the maintenance of the production rate and quality of output at a profitable level. An accurate file of formulas with attached swatches and a careful and constant check of all the variables in the processes will promote this end. Vat dyeing is a lengthy process and the dyer must use every effort to secure his matches in one or two trials. To reduce and strain the color for an add takes many minutes which are ill spared from production. Every added minute in the processing tends to uncertainty in the final result and to added wear and tear on the goods. Shades which are found to be unsatisfactorily dyed at the end of the processing are very difficult to correct, if indeed they can be corrected, and the added treatment is quite costly. The fallibilities of human nature occasionally do send the most perfect systems awry, and it is then that the vat dyer shows his mettle, and that the soundness of his knowledge of fundamentals is tested.

Customers demand close matches to their samples. The mill demands high production at low cost. A dyer can easily produce close matches if he makes several adds and



feeds the color slowly so as to gradually work up to the shade, but a few extra ends may mean the loss of the second set of rolls in a day's production. The vat dyer is therefore compelled to match quickly as well as accurately. There are times when the most complete set of accurate data seems inadequate, but on the whole the matches can be kept sufficiently close by unremitting attention to all details of the dyeing operations and by the careful recording of all steps as each shade is dyed, so that a valuable file of data accumulates which furnishes an excellent guide in the handling of new shades.

LARGE MEETING PLANNED FOR SOUTHERN TEXTILE ASSOCIATION

J. M. Gregg, secretary of the Southern Textile Association, was a visitor at Textile Hall last Monday for a conference with the officers of the Southern Textile Exposition, which is to be held in Greenville, S. C., October 15 to 20. The two organizations are working in close co-operation to make the exposition a success.

Secretary Gregg stated that the October meeting of the Southern Textile Association would probably be the largest ever held. A rough outline of the day's program is as follows: Registration, beginning a 9 a.m., regular business session 10 a.m. to 12, Association luncheon 12:30. The afternoon and early evening will be devoted to visiting the exposition.

At the morning session interesting speakers will be heard. It is the intention of the officers to confine this meeting to helpful and practical suggestions. The sole theme will be new ideas and improved manufacturing methods.

Mr. Gregg also stated that during the week the officers of the Arkwrights and the Master Mechanics would hold meetings, particulars of which will be announced later.

A NEW NATIONAL DIRECT YELLOW

Among the most recent additions to the series of Solantine dyes manufactured by the National Aniline & Chemical Company is Solantine Yellow FF Conc. This color is described as possessing excellent fastness to light and good fastness to washing for a direct color, and is suitable for dyeing all classes of cotton and rayon material that are satisfactorily dyed with direct colors. Solantine Yellow FF Conc. is not dischargeable, nor suitable for dyeing cotton and rayon material that is later to be discharged According to the announcement, however, it can be used in color discharges.

The Processing of Schappe

The Nature of Schappe Silk—Various Sources of Waste in Its Processing—Degumming Process—Washing—Winding and Spinning

By FRED. GROVE-PALMER, A.I.C.

SCHAPPE is better known in the United States and England as "spun silk," and its production forms a portion by no means inconsiderable of the silk output of the countries from which we obtain the greater part of our supplies.

Schappe, which is the name for the material in Europe, Asia Minor and Japan, is different from the ordinary net silk that forms the basis of the industry in that it is not reeled in a continuous thread from the cocoons; it is obtained from the very considerable number of cocoons that, from some accident or another, are not in a condition to make their reeling a matter of ordinary commercial procedure.

After the harvest of cocoons has been collected the whole crop passes through the hands of a body of experienced sorters who separate all those which are in any way imperfect while they are grading the rest into qualities. There is quite a variety of imperfect cocoons, having faults arising from different causes; by far the greater number of imperfect cocoons are those classified as "doubles" or "dupions," which result from the mounting of two silkworms together when the time comes for the spinning of the silk. The outcome of dual spinning is a double cocoon in which the two threads are so involved that it is impossible for the reeling-girls in the filatures to deal with them commercially. It might be thought that it would be an easy matter to prevent two worms from spinning together and so forming a faulty cocoon, but it must not be forgotten that the breeders are dealing with millions of worms and to keep a strict supervision would entail so much labor that the expense would be far greater than the loss on the "waste" from dupions. So far as investigations have been carried there does not appear to be any reason for the formation of these spinning partnerships; they seem to be merely the result of accident: two worms happen to climb upon the same twig and having no sense to argue as to which shall climb down and go on to another, therefore they sit and spin where they are. It has been thought that it might be a kind of preliminary mating, that a male and female worm were thus deliberately setting up house, with a view to breeding when the final change has taken place and they emerge from the cocoon as a pair of moths with different sexes and capable of reproduction, but so far it has not been satisfactorily decided. It does not seem very likely that there is any significance in this double spinning, for at least 90 per cent of the silkworms spin single cocoons and therefore the odd 10 per cent are pretty well certain to be accidental.

Loss in Stifling Cocoons

There is another sort of "waste" silk which is of considerable importance in the spun silk industry; this consists of the pierced cocoons or cocoons which by some means have not had the chrysalis contained in them killed off and in consequence there has taken place that essential change into the moth form; with the result that the perfect insect has gnawed his way out and has severed the whole of the length of silk that was wound round the outside of the cocoon. As soon as the cocoons are formed they are subjected to some form of stifling; in some places poisonous gases are used, but it is more usual, especially in Japan, to do the work by means either of hot air or steam. As the change from the spinning worm to the chrysalis and from that to the moth which eats its way through the silk only occupies a fortnight, it can be understood that those in charge must not be idle but must get busy with stifling as rapidly as may be possible. The loss to the Japanese silk industry from this source alone is quite large, amounting to something approaching three and a half million pounds of cocoons. By far the greater part of this is dealt with as a home industry, only about one-tenth being exported.

These pierced cocoons, and also the dupions, to some extent are treated as a cottage handiwork as opposed to the machine work of the filatures, there being some fifty thousand Japanese families engaged in it in a very small way, each using only one or two basins for the purpose. Owing to the irregularity of the filament and the large amount of trouble and the length of time involved in getting it off because of its broken condition, it would not be possible to handle them in a big filature where the output must be maintained if the enterprise is to be a commercial success.

If the stifled pupae in the cocoons are not very thoroughly dried they will decay and form a filthy black mess that spoils the silk; mistakes in this way and a number of other accidents of a minor kind, each in itself of slight importance but in the aggregate amounting to 5% of the whole, also supply a large quantity of the kind of silk that is classified as "waste," in addition to the dupions. There is also a very considerable amount of "floss silk," which consists of the loose fluffy, woolly silk that is seen

clinging around the cocoon and which keeps it anchored to the twigs; this must be removed before the cocoon is used in the filature and is carefully saved to be added to the total of the wastes. Some is also obtained from the filatures, where the girls have to pick around the cocoons to get a free end; this is spoken of as "reeling waste."

A not inconsiderable amount of these wastes are dealt with by the Japanese themselves, who produce some spun-silk materials, of which they export annually as much as 400,000 pounds weight. We import a little of this but the greater quantity goes to England and European countries.

In addition to these forms of what might be termed natural wastes, there is a very large quantity formed during the course of the various processes through which the reeled silk must pass after it reaches our shores in its transformation into broadsilk and, indeed, after that stage when it is being cut for the purposes of the maker-up. All these contributions are collected at their various sources and eventually pass into the hands of the maker of Schappe, to whom they are, of course, of very considerable value. Some is sold to waste-silk merchants and the rest goes direct to the spinner.

The Degumming Process

Either by the merchant or by the spinner, the wastes are sorted. If they are sorted by the mills that produce them a better price is obtained, for the sorting must take place at some period before they can be properly dealt with. It is most important that all wastes which have not been degummed should be kept apart from the rest; all the imported cocoons and filature wastes, the floes and similar things are received in bales of what is called "gum waste." It is necessary to boil this off, but it is not usual completely to degum, for it is easier to deal with the fiber when it still retains from 5% to 10% of sericin in the subsequent operations. Some mills prefer to spin the waste with more, others with less gum. It is a matter of individual habit and taste. The process of boiling-off varies in different places: a very common method is to use a bath containing the following ingredients:

Water	120	gallons
Marseilles soap	13	pounds
Borax	1	pound

The reason for putting in the borax is to avoid the chance of forming those soaps of magnesia and lime which might occur if the water employed had not been softened to zero point; this aids the ease of washing the partly boiled-off silk. The operation will occupy about three-quarters of an hour at 195° F. and the subsequent washing will be done in a couple of changes of water at the same temperature.

It has sometimes been thought that the writer insists too much upon the question of the softening of the water; it may be so when the softening plant is always working properly and there is no let-up in the regularity of the suppy, but the result of long experience has been to show that one of the most fruitful causes of trouble in the dyehouse and of rejection of broadsilks by the inspectors has been the unexpected breakdown in the water-softening plant, due in many instances to the inattention of the man charged with its supervision, and in many others to a sudden call for water overrunning the capacity of the plant just before it was due for regeneration or re-changing.

Another process for degumming that has been adopted with complete success is the use of liquor containing:

Water	120	gallons
Boric acid	6¼	pounds
Caustic soda	4	pounds

The mass of waste is kept at a constant temperature of 190° for a period of forty-five minutes in this bath. The temperature should be permitted to fall, necessitating reheating. Considerable care should be taken over this, as the maintenance of the heat is one of the essentials of securing the proper working of the solution. A solution of caustic soda alone, of that strength would not be good for the silk, but the boric acid is put in to take the place of a buffer in preventing the destructive action of the caustic alkali upon the fibroin of the silk fiber. If the heat of the bath is allowed to run up over 190° the fiber will be completely degummed and therefore it is important to check closely by thermometer. Incidentally, if the temperature gets above 195° the buffer action of the boric acid ceases and the fiber is rapidly attacked.

On the continent of Europe there is still another method of degumming schappe. This consists in macerating the mass of fibers in a warm bath containing extract of malt for a considerable time—twelve hours or longer—at a constant temperature of 130° F. The action is the destruction, or rather loosening, of the sericin, through the agency of ferments in the malt, and if the heat is greater than above 130° these enzymes are destroyed, while below that temperature the coolness inhibits their action. The reason for keeping the mass of waste on the move is to assist the enzymes in their action of breaking up the coherence of the silk gum, which in its natural state forms a complete armour all over the filament; the working tends to disturb this; after the malting a very gentle soaping is all that is necessary to take away the loosened gum.

Importance of Washing

In whatever way the sericin is partly removed from the fiber, the next stage is the washing to eliminate the

last traces of the chemicals that have been employed in the process of degumming. The silk is then "whizzed" in the centrifugal and afterwards dried. When dry, however, it would not be sufficiently easy to work and consequently it is necessary to "condition" it. This is accomplished by pulling it apart and allowing the piles of matted silky fiber to lie a day or so in a cool, damp room until it shall have picked up as much moisture as it will. This is a definite constant and amounts to about 11%, which is the standard quantity and the one used in practically all the commercial and financial dealings that arise during the passage of the silk waste through the hands of the various people interested in it. The length of time needed for conditioning is easily ascertained after a few trials.

The heaps of softened fiber with its beautiful luster can now be sent forward to the spreaders, the first machines that deal with the manufacture of schappe. The processes through which it goes are very numerous, though not in any very great respect essentially different from the spinning of other fibers of a less delicate nature. In the spreader a revolving drum about two feet wide studded on its periphery with long steel spikes gradually draws an ever-thickening layer of silk fiber to its surface until the spikes are completely buried in the lap of silk that surrounds the drum. This is clipped off and the process gone through once more on the following machine, with the result that there is a beginning of the straightening of the fibers. These laps next pass on to the filler or picker, which does the same work over again but rather more carefully, the result being that the fibers are now nearly parallel. The spikes on the outside rim of the filler drum are interrupted at intervals and at those points the lap is cut through into strips ranging from seven to nine inches in length.

Several of these strips are fixed tightly between two boards with half the length of the fiber protruding like a shawl fringe. This is placed in such a position that it hangs down in close contact with a belt armed with a number of bent steel combs which, passing through the fringe, draw out the shorter fibers as they go. Eventually only the longest of the fibers are left in the jaws of the boards. All through these operations the atmosphere of the rooms must be kept moist, for there is risk of generating static when the air is warm and dry; a humidifier is necessary in this process. Instead of a belt, the combs are often set on the external surface of a revolving drum which does the work equally well and takes up rather less space. The fibers that have been left hanging from the boards are those of the highest grade staple and will be separated for making only the finest quality of schappe, but that which has passed on still contains a considerable amount of very useful staple and is therefore combed a second time. The noils that arise from this are dressed a third time and this third draft yields a lower quality staple fiber that is still shorter. The drafting is repeated until all that is left on the combs is the "exhaust noils" that are too short for combing and need a special treatment.

As the drafts of staple are obtained they are kept separate to be dealt with each according to its quality. The next process is to lift the staple from the boards and make a pile of several layers of the same length and with the wide band of lapped silk thus obtained a long untwisted rope is formed by passing it through rolls that draw it in readiness for the doubler, which takes the single strand of "rope" and changes it into ply yarn by passing it between rollers and through guides that turn out an untwisted sliver. This goes on through the slubbing and roving engines, which make a commencement of the twisting and a reduction in the diameter, until it is sufficiently small to be wound on the roving bobbins, when it will be ready for the usual operations of spinning as carried out in the cotton mills.

In the spinning rooms the thread gets its last twisting draft, which makes it fit for use in the looms, both as regards size and tensile strength. Spinning engines such as the flyer, the ring system, the mule or the cap are suitable, the one used being decided by the quality of the yarn that is wanted in this particular instance and the condition of the silk fiber that is passing through the mill.

Of yarns the singles for shoot are wound upon paper quills in a general way in readiness for the shuttle. The ordinary methods apply to the manufacture of two and three ply yarns. Exceptionally high-grade yarn may be obtained by singeing in the gas flame in order to remove all superfluous hair caused by the ends of the staple and yield a smooth thread of very high luster.

The broadsilks that are made with spun silk yarn have a number of high qualities, some of which are peculiar to itself. It has not the same luster but it is harder wearing and stands up to the effects of laundering better than ordinary silk. It is because of this latter quality that large quantities of Schappe silk is woven into the material usually called "silk longcloth," which finds a large market for the making of ladies' underwear.

In the hands of the dyer and printer fabrics made of spun silk offer no difficulties other than those usually encountered in dealing with broadsilks, and it has the advantage that its naturally firm handle makes it as easy to deal with as a broadsilk of very high quality.

Turning back for a moment to the "exhaust noils" and other low-grade noils, these consist of the very shortest fibers only and may be treated on machines similar to those employed for handling wool noils. The process generally is rather shorter than that already described as there is less necessity for elaboration. The rope produced in the carding machine is spun straight on mules without the introduction of those intermediate steps which have been alluded to.

The material that is woven from the noils is a coarse ugly cloth that finds a use for covering the charges of explosives used for guns in the Navy and Army. After the war great quantities of it came on the market dyed in various shades for a number of domestic purposes. It was sold very cheaply and had some little value for curtains, summer frocks, children's overalls, and so forth.

It is a very unpleasing cloth in appearance but has the quality of wearing and washing very well, which recommends it in some quarters.

All the description of treatment of gum waste after the boiling-off applies equally to those classes of what is usually called "mill waste." The pieces of fabric that are received from the making-up establishments which result from the cutting out of many hundreds of garments, are torn to shreds and eventually threaded out into a mass of fibers.

But there is a very large quantity of waste reaching the hands of the merchants that should never be allowed to pass the factory gates. This consists of partly emptied quills that are thrown out of the shuttles. The buyer of these has usually installed a very small winding plant and rewinds this waste into a very profitable form; he buys it for next to nothing and by the expenditure of very little trouble and the work of a few skilled girls, he can make a very decent quality of silk for resale. It is surprising that any weaving mill with any pretensions to efficiency should permit this to go on. Waste of this nature should never be allowed to figure on its books. Granted that it is better than burning it, as was seen taking place by one of our authorities not so long ago when he was visiting at a silk mill. The whole thing might be saved by setting aside a small room with one or two operatives simply to deal with the wastes on the quills. They would more than earn their wages in the quantity of waste recovered for standard use.

Certified Biological Stains

What Stains Have Done for the Science of Biology—Stains in Medical Research—How Stains Are Standardized—Regulating Strength—Dye Properties Affect Staining Technic

By W. C. HOLMES

Color Laboratory, Bureau of Chemistry

ALTHOUGH the amounts of dyes which find application in biological staining are a relatively insignificant fraction of the total output, it is very possible that the essential importance of this minor application outweighs that of all industrial uses of dyes combined. In his miniature dyeing operations the scientist is a "practical dyer" of the foremost order.

There is no field of knowledge in which the advances of the past fifty years have been of such vital value to mankind as in that of the biological sciences. Our understanding of the materials and processes of both animal and plant life and of the diseases which affect them has increased greatly. In a large measure this advance has resulted through microscopic investigation and the utility of the microscope, in turn, is greatly dependent upon the use of biological stains.

Although the earliest staining agents employed by microscopists were natural coloring matters, of which some still find important application, and although inorganic reagents are occasionally utilized, the great majority of present-day stains are dyes of synthetic origin. Many of them were once, or still are, familiar acquaintances of the practical dyer, such as Bismarck Brown, Orange G, Congo Red, Fuchsine, Crystal Violet, Safranine and Methylene Blue, although the ordinary textile grades of such dyes are seldom entirely suitable for staining purposes. Others are dyes which find little or no application in other fields. Still others are mechanical mixtures or even basic-acid dye complexes.

The development of the synthetic dye industry made available numerous stains of general or specific utility in microscopic technic by means of which detail may be brought out readily which could hardly be recognized otherwise through the most careful and thorough study. Dyes may be said to have transformed microscopic investigation from hard work into a fascinating pastime. It is not surprising to find it recorded that the youthful Ehrlich became an incorrigible dabbler in stains and never outgrew his inclination to return to his dye-pots. It was doubtless from visible evidences of selective stain action that he derived the inspiration to undertake the studies which resulted in the discovery of salvarsan and the faith to persist in his search through countless disappointments.

Different constituents of animal or plant life exhibit widely different degrees of affinity for different dyes and may be differentiated, accordingly, by the selective action of stains. The behavior of individual elements towards stains varies, furthermore, with their stage of development or of injury. Botanists, anatomists, histologists, zoologists and bacteriologists place great dependence upon the examination of stained materials both for the advancement of pure science and for the utilization of their science in matters of vital practical importance.

Stains in Medical Research

The extreme value of stains to the medical profession is particularly evident. They make it possible to demonstrate the presence and extent of diseased conditions, to diagnose the nature of the disease and to follow the effect of medical treatment upon it. With suitable stains

and technic, for example, it is possible to stain specimens of blood or tissue in such a manner that all normal or abnormal components are colored differently and rendered visible, and the presence of malignant organisms is recognized and their character and type defined. Even when disease may not be attributed to a specific organism it may sometimes be diagnosed by the character of its effects. Thus cancer may be recognized in time for effective treatment. Stained specimens, in short, are as useful to the pathologist as were cigar ashes to Sherlock Holmes. The claim has been made that the expert pathologist can estimate closely a patient's age from a bit of stained tissue and can determine whether or not he has been in the habit of 'looking upon the wine when it was red" or even whether or not the wine in question was of the pre- or post-war variety. At all events he can be relied upon to learn much which is indispensable to waging effective warfare against disease.

Early in the development of biological staining it became evident that the microscopist could not depend upon the market supply of textile dyes for his needs. Even when such grades of dyes were at all suitable the products of different manufacturers frequently differed in a decided degree. Even successive lots of the same dye from the same manufacturer were not invariably uniform. The situation was met by Dr. Gruebler in Germany through the formation of a company which undertook to supply microscopists with satisfactory products and the use of Gruebler stains soon became practically universal. The Gruebler Company were dye brokers, primarily, rather than dye manufacturers. They tested the products of the dye plants for their suitability in staining and interested manufacturers in supplying special materials. They purchased large lots of such products as proved satisfactory, thereby assuring the scientist of reliable and uniform supplies over protracted periods. The valuable service rendered by the Gruebler Company in this manner was not fully appreciated until the World War interrupted the export of their stains. The chaotic conditions which followed have eventually resulted in the development of stain industries in several countries. The progress made in this field in this country will be reviewed briefly.

In 1920 Dr. H. J. Conn, then chairman of a committee on bacteriological technic of the Society of American Pacteriologists, initiated a co-operative investigation of market supplies of the more important stains and secured the collaboration of the Color Laboratory of the Bureau of Chemistry in their examination. By the fall of 1921 it had become evident that organization was advisable along broader lines. This was effected under the auspices of the National Research Council and generous financial support was obtained, at the same time, from the Chemical Foundation. A year later the present Commission on Standardization of Biological Stains was organized as an independent body to relieve the Research Council of all responsibility for its actions. The commission is a non-commercial organization with eligibility for membership contingent upon qualifications and willingness to co-operate in its activities. An enrolment of seventy members was reported last year. The primary objectives are those of assuring microscopists of supplies of reliable stains and of advancing the science of staining in every possible way.

How Stains Are Standardized

It is owing to the activities of the commission, in a large measure, that this country now has a creditable and vigorous stain industry. The commission has drawn up specifications for the more important stains and introduced a system of voluntary certification. Any manufacturer of stains is eligible to apply for certification. Samples of each batch of dye on which certification is desired must be submitted for examination, and certification is granted (and commission labels attesting that fact issued) only on supplies which prove satisfactory. Although the manufacturer is under no obligation to apply for certification the degree in which they are availing themselves of the privilege affords ample evidence of the high regard in which certified stains are already held. So large a proportion of American stains are marketed as certified stains that the terms are practically synonymous.

The commission has not been content with aiming at a mere duplication of pre-war products. The Gruebler system was by no means ideal nor were their products beyond criticism. The aim is for progressive improvement in stains and although much remains to be accomplished excellent progress has been made.

The commission label assures the biologist that the stain has been tested by competent technicians and found satisfactory for employment in the more important applications in which it finds use. Every effort is made to refer samples to those whose opinion may be accepted as authoritative. No other factor contributes in such an important degree to the value of certified stains as does this system of practical testing in actual performance.

The label assures the biologist of the essential identity of the product in so far as is possible at this time Whether a stain is an individual dye or a mixture it should be of a relatively definite character. The chemical character of any given stain should be defined within as narrow limits as may be feasible and certification refused to any product which does not conform to normality provided the label does not specifically inform the customer of that fact. In the past there have been numerous instances in which supposedly normal dyes have been marketed as stains which contained large proportions of subsidiary coloring matters, alteration products of the dye or foreign dyes deliberately added. In other instances an entirely different dye has been supplied from that stated on the label, as, for example new Methylene Blue N for Methylene Blue, Methylene Blue for Methyl Blue or Erythrosine for Magdala Red. The most familiar in-

stance is the supposed "Eosine" employed by Mallory in developing his well-known Eosine-Methylene Blue technic. It was learned subsequently that Eosine is relatively unsuitable in this connection, and it is practically certain that Mallory's original "Eosine" was, in reality, a mislabeled Phloxine.

Regulating Strength of Dye Stains

The commission label, furthermore, contains a statement of dye content (again in so far as it is possible to supply that information at the present time). The customer's economic interest in the matter is obvious and its importance in enabling him to prepare stain solutions of definite strengths may hardly be exaggerated. In many staining technics it is desirable to regulate dye concentrations within narrow limits, and solutions of known and definite strength can be prepared only when the actual dye content of samples is available. The users of pre-war stains worked on the basis of percentage of the gross sample or, more frequently, on that of regulated dilution of saturated solutions of their stains. The strength of their solutions varied under the former system with variation in the dye content of different samples, and under the latter system with variation in salt content and the operation of other factors. It appears probable that much of the difficulty which was encountered by biologists in their early attempts to replace pre-war stains by American dyes arose directly from such causes. The American stains contained decidedly more dye and less salt, in general, than the products which they replaced and gave solutions of higher dye content by either method of preparation. Such solutions were frequently too strong to give satisfactory results with the technic which had been developed with weaker solutions.

The co-operation of the color laboratory has been of great service to the commission. Methods have been developed for the identification and quantitative evaluation of numerous dyes, solubility data obtained and many samples of stains examined. A considerable variety of dyes which would otherwise have been unavailable for testing in staining application have been synthesized, particularly in the phthalein and thiazine groups, one of which in particular, Azure C, or monomethyl thionine, has proved a valuable nuclear and bacterial stain of considerable utility in blood staining. Biological staining has been developed, in large measure, by utilizing only such dyes as have been readily available by reason of their textile importance, and it is reasonable to anticipate that the synthesis of related dyes will occasionally lead to the discovery of superior stains. Even when such products prove to have no outstanding merits they may be of great service in comparative staining tests through affording evidence on the correlation between chemical structure and staining properties. A more complete understanding of this correlation is a necessary prerequisite for systematic advancement in staining.

Practical technicians in all branches of biological science have done much to assist the commission, and it is obvious that the future development of staining will depend largely upon their efforts. It is this consideration, primarily, which has led the commission to publish a handbook, "Biological Stains," of which a second and enlarged edition will appear soon, and a quarterly journal, "Stain Technology," now in its third year. The former supplies the biologist with general information on stains and staining, and the latter with current developments in that field. The stimulative influence of these publications may well prove of great importance. To a large degree the art of staining has been developed with materials of uncertain character and technic of an empirical nature. Considerable improvements may be anticipated with a more definite knowledge of the stains used and a better understanding of the mechanism of staining technics.

An illustration in point developed in a recent collaborative investigation of the well-known Ziehl-Niehlson technic for the detection of the tuberculosis organism, carried out by the Army medical authorities and the Color Laboratory. It was learned that the essential mechanism of the staining consisted in the absorption by the organism of a definite addition-product formed by the interaction of the Fuchsine and the phenol. It became obvious, at once, that the customary technic of the test was unnecessarily clumsy and that improvement would result from the use of a solution of the pure addition-products of this type in question. (It may be noted, in passing, that addition-products of this type give promise of extensive utility in staining, both as such and when further combined with acid dyes.)

A further instance in point is developing at the present writing. It was formerly held probable that the staining of bacteria in soils by the dyes of the eosine group was dependent, primarily, upon chemical factors. On this assumption extensive studies have been undertaken of the influence of constitutional variation in these dyes upon their staining properties. Although the results obtained in these studies were of much interest in various respects they failed to contribute in any very material degree to the advancement of practical staining. More recently, however, evidence has been obtained which indicates that certain physical properties in these dyes have the preponderant effect in determining their staining effectiveness, and it appears very probable that the recognition of that fact will lead to notable improvements in staining soil bacteria.

The co-operation of American manufacturers of stains with the commission, finally, has been highly commendable. In view of the fact that the market for stains must be reckoned in pounds rather than in tons their willingness to undertake research in dye manufacture has frequently exceeded normal expectations. It appears probable, however, that their policy will prove justified. It is gratifying that sales of certified stains have recently been reported even in the native land of Gruebler.

Practical Hints on the Production of Bright Colors on Textile Fabrics

Part XLI

Ombre Effects in Two Colors—Various Modifications of Two-Color Effects—Stripes, Lines and Similar Designs in Printed Ombres

By RAFFAELE SANSONE

Cotton cloth goods are sometimes printed with the ombre effects each of a different color and assume a quite special appearance, which can be altered more or less in accordance with the way the ombre of two colors is disposed. In one of the simplest cases a pink ombre is followed by a red ombre, each effect being printed close to the other, leaving no white space in between. In this way the eye passes from a very light shade of pink to ever darker gradations of this color, starting again with a light shade of the red and passing gradually to the most intense gradation possible with this color. Here the space occupied by each ombre can play an important part, rendering the effect more marked, or less marked; the blending of one intensity of shade into the other more gradual or more rapid.

A two-color ombre of more complicated nature would be produced by printing a violet in various gradations against a blue in all its shades, so that the darkest and the lightest shades meet continually down the piece. Through this arrangement the ombre is of double nature and much more beautiful than in the first case. The effect can be varied in this instance by printing simple stripes, by printing thin lines forming the stripes of each shade, or by similar means.

Another very attractive effect can be produced by printing a double ombre in a dark or medium color in such a manner that the most intense stripes remain always in the middle and, crossing this with a single or double ombre, produced with a lighter contrasting color. A variation could be produced by using a blue for the first ombre with the deepest shade in the middle, and following this on the two sides by weaker and weaker gradations until reaching the lightest that is followed by a slip of the white material. This effect would be crossed by a double ombre produced with a contrasting color, such as yellow, green, pink, violet, etc.

The printing paste used in the first case could be prepared as follows: 20 parts of a suitable Methylene Blue are dissolved in 158 parts of water and 90 parts of acetic acid at 6° Be., adding after this 600 parts of the paste indicated below and 30 parts of glycerine, 2 parts of tartaric acid and 100 parts of a tannic acid solution containing 1 part of the acid and 1 part of acetic acid; for the bright yellow 20 parts of a suitable Auramine are dissolved in 70 parts of acetic acid at 6° Be., and 180 parts of water, adding after this 600 parts of the filling given below, 30 parts of glycerine, 2 parts of tartaric acid and 100 parts of a tannic acid solution containing 1 part of the acid and 1 part of acetic acid.

The filling paste is prepared by mixing 1,200 parts of wheat starch with 6,000 parts of water for forming a uniform dough, which is then warmed gradually to the boil during continual agitation. A semi-transparent paste thus results, to which are incorporated 1,800 parts of a 6% gum dragon solution and 1,000 parts of acetic acid at 6° Be.

By mixing the necessary quantity of further filling with the above color pastes the baths are then prepared that are to produce on the printing machine the different gradations of the double ombres, introducing them in the troughs, and conducting the treatment of the cotton cloth. This is then dried in the usual manner under such conditions that the design cannot be smudged in any way, and steamed for one hour without pressure, or for one-half hour with one-half atmosphere of pressure. After this fixation is conducted with a tartar emetic bath, following with a complete washing and drying and finishing in the most convenient manner.

Ombre with Two Colors Superimposed

If an extra fine ombre is desired, besides regulating with care the different gradations of the same color, a

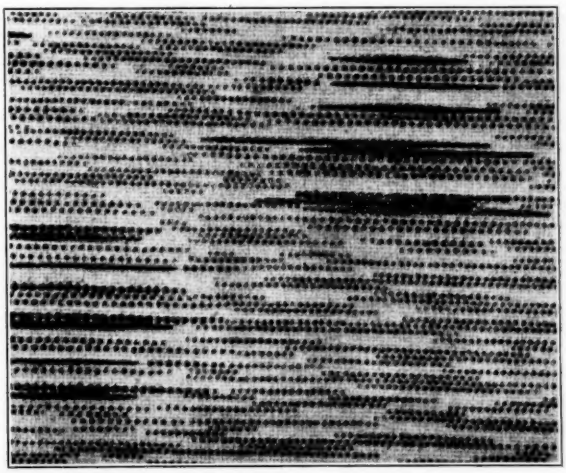


Fig. 1

certain brilliance is attained by using a pure white ground and a highly lustrous material, and printing over the ombre itself a suitable effect, which, while hiding the different shades as little as possible, gives these a special appearance. For the purpose the contrasting color must be placed under special conditions. Thin vertical, horizontal or inclined lines at a small interval from one another would serve in some cases, while in others small squares, circles, rectangles, triangles, etc., would be of more value, and in others special designs, a shading with straight or inclined thin lines may be necessary. In this instance a change can be produced by printing one only intensity of color above the ombre shades all through, or two or more intensities.

In the above case, for the base ombre an orange could be employed, forming effects at a small interval from one another, with the darkest shade in the middle and gradations that gradually diminish in intensity at the sides, until differing little from the slip of white ground that follows. To render the different stripes brighter these would be formed by very thin lines running across and above. The resulting effect would be printed series of small red circles or rings of the same or different size.

There is no doubt, however, that further variety could be produced by leaving some of the ombre stripes uncovered, using on some the above rings and on others small squares, triangles or rectangles, or using a thin lining on some or all that, with some articles, could be inclined in one or two directions and, with others, could be vertical and, others, horizontal. Besides this the contrasting color could be applied as a contrary ombre, formed by very thin lines placed widely apart, or small lines broken off at intervals. Through this arrangement the darkest covering would remain on the lightest shade, and the lightest on the darkest. A series of thin lines could also cross the ombre stripes vertically, being printed with the greatest intensity on the lightest shade, and less intensely as the shades become darker.

Ombres with Differently Constructed Stripes

By using stripes of different construction special characteristics can be given to ombre effects. Thus, by printing these as undulations or endless spirals down the length of the goods, the latter assume a very interesting appearance, differing from all other printed goods. The effect can be varied also in this instance by rending the stripes larger or smaller, reducing or increasing the degree of the undulation, substituting the undulated stripes by zig-zag stripes, using filled stripes or stripes with thin lines, or straight stripes with projecting triangles.

Another possibility would be the formation of the ombre stripes by many colored squares, rectangles or triangles, causing the effect to be fractioned, varying or regulating their distance apart, using more in the darker and fewer in the lighter shades, or *vice-versa*. The printing can be conducted so that the small rectangles, squares or triangles follow the first lightest line under conditions to form an ombre downward, starting at the exhaustion of the darkest shades with the lightest and continuing in this way all through. A special type of pattern thus results where the ombres can run across the wefts and along the warps, in which changes can be introduced in accordance with the class of goods to be produced.

In some articles the ombre stripes could be produced with thin dots placed at any distance from one another, by themselves or intermixed with dots of larger size, squares, rectangles, rings, triangles, oval, zig-zag lines, undulated lines, etc. Even in this case the effect could be made so as to appear both across and along the piece, or across the piece from right to left and *vice-versa*, being varied by leaving intermediate white spaces, etc. With others an imitation of lace could be used in the stripes or imitation of knitted goods, woven goods, veiling, netting, etc., where the first, second and third are colored and the others white or lightly colored; a change being introduced by suitably placed rings, designs, etc.

The ombre effects produced with series of very thin lines are quite numerous and, besides those already indicated, quite a large series of others are possible. By using lines of different width, varying the spaces between, spreading somewhat the stripes of different colors, and using in these very thin lines at the beginning that gradually increase in width, a partial ombre effect would be produced which complicates that already resulting from the stripes themselves. A further complication can be created by placing first the width lines, and following these by the thinner; by producing the change two or more times in each stripe; by running across the stripes with much shorter lines that are quite thin at the beginning of each ombre stripe and become wider as they near the end. By using such lines straight, undulated or forming a zig-zag, and by leaving the effect smooth, or complicating with designs. Besides the above, the lines employed can be placed along and across each ombre stripe, can cross this from left to right or in both directions, the lines being all of the same thickness or of different thickness.

The thin lines that constitute the ombre stripes can be interrupted at intervals so as to remain all at the same height, forming a white or colored rectangular or square space in between, or can be caused to slant from an upper initial line, forming triangles where the white or colored ground appears. The thin lines can also be made to rise from a lower initial line, while with other articles one stripe can have the first small thin lines rising and the next the thin lines descending, producing internal white or colored squares that can be left as they are or filled with a lined effect, a design, or another effect.

Ombres with Stripes and Lines

By using stripes and lines together a certain variety and attractiveness can also be introduced in the ombre effects. A class of goods of some value can be produced

(*Continued on page* 639)

Proceedings of the American Association of Textile Chemists and Colorists

The American Association of Textile Chemists and Colorists

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FORTY-EIGHTH RESEARCH COMMITTEE MEETING

THE Forty-eighth Research Committee meeting was held at the Engineers Club, Boston, Mass., on Friday, September 14, 1928.

The following members were in attendance: Prof. L. A. Olney, E. H. Killheffer, Jos. F. X. Harold, William R. Moorhouse, William H. Cady, W. M. Scott, D. P. Knowland, H. Christison, W. E. Hadley, W. S. Williams, R. F. Culver, P. J. Wood, William K. Robbins, R. W. Hook, H. D. Clayton, Charles E. Mullin, George A. Moran, H. W. Leitch and K. R. Moore.

J. Hutton, H. A. Barnes, E. C. Bertolet and Edward F. L. Lotte were unable to attend.

The first Launder-ometer has been completed by the Atlas Electric Devices Company, and sent to the Bureau of Standards in order that the proper rate of rotation may be established. Thus far, the experiments and tests which have been made have proved it to be perfectly satisfactory. It was brought to the attention of the Research Committee that before the Launder-ometers are ready to be shipped to customers it would be desirable to print Standard Tests to accompany it, covering the several methods. In this connection, it was pointed out that the NEFAL fastness label, being introduced by the National Association of Finishers of Cotton Fabrics, was based upon fastness requirements already filed with the Bureau of Standards and with the Federal Trade Commission.

It was pointed out that the Federal Trade Commission hopes to see established a trade practice in regard to fastness requirements which can be used as a precedent in prosecuting any claims which may come to their attention but if no trade practice is established then each individual case will have to be settled on its own merits. Attention was drawn to the fact that there will, of necessity, be different groups which desire special tests, and the fastness tests of the Association are so comprehensive that they of necessity must cover any case which will arise.

Dr. E. H. Killheffer pointed out that the Finance Committee had held several meetings and had endeavored to formulate plans as to just what should be accomplished to faccilitate the work of the Research Committee.

It was proposed to hold the next Research Committee meeting in New York on Friday, October 26.

Respectfully Submitted,

WALTER E. HADLEY, *Secretary.*

COMMUNICATION

IN correspondence from Dr. S. G. Barker, our attention has been called to the fact that the statement in regard to the Fugitometer, as made in the report of the Forty-sixth Research Committee meeting, published in the June 11, 1928, edition of the Proceedings is decidedly misleading.

The misunderstanding is due to the fact that the Fugitometer under discussion in this report was an early type of this apparatus, which since that time has been greatly improved. In order that any misunderstanding may be corrected the following statements from Dr. Barker's correspondence are being published:

> "I note that in a report of a discussion on the relative merits of the Fade-ometer and the Fugitometer, you state that it was finally conceded that there was little difference between the two instruments. As his statement is entirely contrary to our experience, further, contrary to all scientific research, which necessarily implies that in all tests standard conditions must be observed at the surface of the pattern, I hasten to ask you to correct the statement.
>
> "I see, further, that you state that in the Fugitometer the fading is retarded by 10%. While this was true in the earlier instrument, in the design which is now being put on the market in its final form it is no longer the case. The earlier instrument was purely for experimental purposes and it is unfair to judge the performance of the final product on what was, after all, only a laboratory pattern. The retardation in the rate of fading now is very, very small and, while the new instrument possesses all the advantages of standard conditions of temperature, humidity, etc., at the surface of the pattern, it also is much handier in form and better to work than anything else.
>
> "As a result of our work, there is no doubt that humidity plays an important part on fading and unless it is in control at the surface of the pattern the results cannot be comparable."

The American Association of Textile Chemists and Colorists appreciates the interest which Dr. Parker and other British scientists are taking in the work of our Research Committee, and we shall in return offer our full co-operation in every way.

LOUIS A. OLNEY, *Chairman Research Committee.*

Applicants for Membership

Active Memberships

Miedendorp, Henry, Jr., consulting textile engineer, The Clark Thread Company, Newark, N. J. Sponsors: H. Grandage and W. E. Hadley.

Gallagher, T. F., superintendent St. Louis Finishing Company, St. Louis, Mo. Sponsors: A. T. Brainerd and A. J. Mease.

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Axelrod, Jacob, assistant dyer, Real Silk Hosiery Mills, Indianapolis, Ind. Sponsors: C. E. Bick and M. Fleischmann.

Changes of Address

Gaede, A. Henry, Hotel Imperial, Greenville, S. C.

Gerry, Henry S., 149-23 Forty-sixth Avenue, Flushing, N. Y.

Goosetray, Arthur, c/o John Goosetray, 58 New Hartford Street, New York Mills, N. Y.

Gordon, H. B., care of Mirel Company, 1441 Broadway, New York City.

Hall, F., 2 Charles Street, East Williston, L. I., N. Y.

Jaeger, Jr., Robert, 296 Knox Avenue, Grantwood, N. J.

Kenyon, Frank, care of Pacific Mills, Lawrence, Mass.

Maurer, Alexander, 568 Twenty-sixth Street, Paterson, N. J.

McCullough, Hector A., 559 Smithfield Avenue, Pawtucket, R. I.

Peel, Tom, 111 Middlesex Street, North Andover, Mass.

Schmidt, Milton, care of Hamilton Woolen Company, Southbridge, Mass.

Smith, Harold D. W., American Express Company, Charlottenstr, Berlin, Germany.

Smith, Robert H., Box 54, Durham, N. C.

Sprock, Howard M., 261 Seaman Avenue, New York City.

Springer, Sidney, care of General Dyestuff Corporation, 230 Fifth Avenue, New York City.

Webb, R. H., Box 187, Roanoke Rapids, N. C.

The Dyer's School of Experience

[EDITOR'S NOTE.—*The following narrative is one of a series being published under the general head of "The Dyer's School of Experience." Realizing that the genuine material for such a series is to be found largely among its own readers, The* REPORTER *solicits contributions from that source and will pay for those accepted at regular space rates. Among the readers of this journal there should be many who have, in the course of their experience as dyers or chemists, encountered incidents which should prove most interesting and helpful to their fellows. Send all manuscripts to* AMERICAN DYESTUFF REPORTER, *90 William Street, New York City.*]

A CALL FOR STORIES OF EXPERIENCE

By NOEL D. WHITE
Davenport Hosiery Mills, Chattanooga, Tenn.

I HAVE been reading with a great deal of interest "Getting Experience," by One Who Did, and I can readily sympathize with him, for he certainly did get some unexpected jolts, and also because I am well acquainted with the scene of his battle grounds. While I was never handed such raw deals, more than once while I was in that city I managed somehow to get out from under before the blow fell. On one occasion I had taken a job to dye material that the boss did not know how to handle, but a suspicion kept growing on me that what they wanted from me was to learn all they could on that subject, and when I became reasonably sure my suspicion was well grounded I told them where to "get off." Such narrow-minded people, one is pleased to think, never go very far. In this case both Mr. Manager and the man whom I was unknowingly expected to teach lost their jobs. Had they had sense enough they would to-day be at the head of one of the largest manufacturing corporations in the country, having mills scattered in several States, but it takes better brains than they had to grow to big positions.

Now, if some brother dyers would come out and tell their experiences the School's column could become a notable feature of the REPORTER. I have been told by many readers that the first thing they do on receiving the REPORTER is to turn to this department to read some dyer's experiences, and I am quite certain that we could all help keep the column going if only more of us would sit down and, for the benefit of the brotherhood of dyers, write about some of the incidents, humorous or otherwise, that have happened in the pursuit of our vocation.

The editor is well aware that most of us who work in the dyehouse are not literary geniuses and he does not expect from us any gems of English literature. He may get them from professional writers. Also he knows that most of us do not own a typewriter or could not use one if we had it. So, brothers of the dipper, let us have some of your experiences, for I know we will all enjoy reading them and, who knows, many may profit by them, even though you have to write them laboriously with a pencil on scrap paper. I am sure there are any number of incidents that we should all be glad to hear, and believe that with most of you it has merely been a case of putting off the writing day after day. There's no time like the present!

For instance, we would like to know how you stopped that leak that ate into the profits of your department; or, how you convinced your employer you were the man for that job, even after you made several blunders and should have been kicked out; or, how you have grown a crop of white hair prematurely because the superintendent had a grudge against you and made your job a hell on earth for you, for a time; or did you ever have a helper you wanted to murder for something he did that spoiled some especially critical job? And that reminds me of something that happened some years ago, over which I can smile at this late date, but which was no joke when it happened.

I was working in a big dye plant in a town not far from New York. It was my first venture in piece dyeing, and I was dyeing single pieces in open vats with hand reels. All kinds of weave and material in fifty-yard pieces were given me to dye. One day I had dyed a number of pongee pieces with a large percentage of tussah silk making up the mixture. This kind of goods has to be dried spread out in moderate heat so as to dry them as evenly as possible, or they would show watermarks in rings that appeared as if the dyeing had been uneven. If left rolled up for any length of time after coming from the extractor some places on the outside of the bundle would dry up and show spotted. It was not a serious matter, as all there was to do was to wet it out again and then do a better drying job to prevent these water spots. The next day the boss came to tell me that I had two pieces water spotted, and to be sure to wet them again before I left. The last thing I did before whistle time that day was to take two men and give each a piece to wet out. One was dyed light lavender, the other navy blue. My men each took a piece and then started a friendly race to see which one could finish his job of wetting first. The man with the lavender piece won. He raced to the extractor room and slammed his piece, properly rolled up in a thin piece of cloth, on the table. Soon after the other man came along with his navy blue piece, and slammed it down right on top of the lavender piece with the blue water from the bleeding navy oozing from it, and running all over and through the lighter piece; and being quitting time they both went home. I was making a round of inspection and getting ready to go home myself when the man in charge of the extractors called me to show me what those men did. Any dyer who ever saw his work wantonly spoiled in such a way can well imagine what I thought, and what I said (I am sure the editor would not allow it to be printed).

but I had murder in my heart when I went home that night.

My feelings did not improve the next morning, for as I went back to the dyehouse the boss called me in the drying room to show me another piece that had received a similar careless treatment. It was a 50-yard piece of Peau de Cygne, a very close woven silk that was usually dyed, when several pieces were to be of the same shade, under tension. This was a single piece I had dyed loose in an open vat with a hand reel, and handled very carefully to prevent any creases, for in this kind of cloth any crease would remain visible, impossible to remove in finishing. After the last rinse this work had to be rolled on a wooden beam and whizzed in a specially constructed extractor. This piece had been dyed a strawberry shade, and upon inspection showed on one end of it, and at regular intervals for several yards a blue streak running the whole width. I could not imagine at first what had caused those streaks, but I rolled the piece on the roller—starting from the clean end of it, and found that where the blue streaks started they fitted nicely one upon the other, from the first to the last. When that piece was brought in to be extracted it was laid on the table, and as other pieces were brought in they were pushed together and my piece had finally come into close contact with another that had been dyed dark blue, and my piece had absorbed some of its neighbors' exuding blue water. Here is where the blues were getting the best of me! I did not stay long on that job.

Some years ago colors in hosiery were not so numerous as at present. The biggest part was dyed black as everyone knows. As in our plant we could not afford to pay a man to weigh out the dyestuffs, I thought that it would be a good idea to train a man to weigh out the black dye and teach him how to carry out the whole process. The man I chose proved to be quite willing and in a short time became proficient enough so that I could trust him to do it right. Our blacks were dyed mostly in a 200-pound machine. We boiled off our hosiery, rinsed them in two hot waters and dyed them in the same machine with Developed Black. We washed them and diazotized them, washed again until the sulphur smell had disappeared, then developed the black with a mixture of beta-naphthol and meta-phenilenediamine. I had taken pains to instruct him before making up the developing bath to stick his nose in the machine and see that there was no smell left from the diazotizing bath. Aside from the fact that once he dyed a lot of 200 pounds of silk hosiery for me without first boiling it off, and never found it out until it was sent to the boarding room and returned to the dyehouse because the silk had the gum still on it, this man never caused much trouble. However, he took sick with the flu and while he was out I had to take my next best man and let him dye the blacks. George knew all about it, had watched Gus do it, and I could trust him—or so he told me. Nevertheless, I stood with him and made sure that he knew all the operations, the exact weights of dyestuffs and chemicals. He had worked in another dyehouse several years, and had been with me more than six months, so it was reasonable to suppose that he could be trusted.

Our dyehouse is in one large room, and everyone sees what everyone else is doing. Anyone so inclined can learn to be a dyer if he wants to, because in our dyehouse there is nothing hidden; even our dyeing formulas are open for inspection to anyone who cares to look at them. However, no one apparently cares to learn any more than is strictly necessary for him to hold his job.

One day George had put the dyestuff on a lot of black. He was now diazotizing it, and when it had run half an hour someone came to tell me the boss wanted to see me in the office. I called to George and told him it had run long enough and was time to develop, then I started for the office. On my way down I had some misgiving. Would he know what to do? I felt like running back, but the thought that he had been so long in that room and in the other dyehouse reassured me. I was with the boss only a minute or so, and when I left I instinctively rushed back to the dyehouse. What I had feared had happened. When I told George it was time to develop, he forgot previous instructions and all that he had seen done so many times before, and had put the developer right in the diazotizing bath—and such a mess he made of it! A look at the machine told me what he had done, the bath had turned a brownish flourescent color, ditto the hosiery. Well, it was up to me now to repair the damage, but what should be done in a case like this was more than I knew. No use pulling out my few remaining hairs, or to exhaust myself cussing the man out. I let that bath out and washed the lot, then sat down to think what I could do to fix it. Finally I did what most dyers would have done in similar cases: A good boiling soap bath to remove what I could, then start all over again.

Cases of this kind are aggravating, and as misery likes company, we would like to hear of other dyers who had such experiences. I am sure none of us will act like the dyer to whom I was narrating the incidents of the blue pieces, related above. I was new to the work and to the place; he being an old-timer there, I thought he would be sympathetic, but, he cut me short, saying, "Don't come to me with your troubles; if you are looking for sympathy you will find it in the dictionary."

GERMAN FIRM WANTS AMERICAN INTERMEDIATES

A Leipzig manufacturer has expressed a desire to Consul F. van den Arend, Leipzig, to be placed in touch with American firms exporting coal tar intermediates. This firm is interested in a number of products of this character and quotations are desired in lots of 100 kilos; small samples are requested. A list of the products together with the name and address of the inquiring firm will be furnished to properly accredited American firms upon application to the Chemical Division.

AMERICAN
DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

LOUIS A. OLNEY
PROFESSOR OF CHEMISTRY AND DYEING, LOWELL TEXTILE SCHOOL
Directing Editor

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Managing Editor

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THE ORAL PRESENTATION OF PAPERS

THE following suggestions recently appeared in the Journal of the American Society for Testing Materials, and were credited to the president, H. F. Moore. They should be extremely interesting to those who may be prospective speakers before Local Sections or at the Annual Meeting of the American Association of Textile Chemists and Colorists. They may, in fact, not only prove of considerable value so far as the speakers are concerned, but may also result in an increased interest upon the part of the listeners.

It is our experience that a very excellent paper may be presented in such a manner as to lose much of its effectiveness, and the result may not register for more than 50 per cent of its real value. On the other hand, a paper of far less merit may be presented in such an admirable manner as to impress the listeners on a hundred and fifty per cent basis. Writes Mr. Moore:

"It would be going altogether too far to say that a good presentation may make mediocre material worth while, but it is certainly true that an ineffective presentation may seriously diminish the value of good material. One effect of a good presentation of worth-while material is to give the listeners the impulse to read, or to reread, the printed paper, to cause them to speak of it to their friends, and to help the work to receive the attention it deserves, but which it otherwise may not receive.

"In general, the oral presentation of a paper requires a different treatment from the written presentation. The writer would urge the authors, especially the younger ones, to prepare in addition to their written papers, careful notes, or, better still, completely written papers for oral presentation designed to emphasize and elaborate the chief points and to omit, in so far as it is possible, matter of secondary importance. It may seem rather absurd to some to urge a 'rehearsal' of a technical paper, yet the reading aloud of the material prepared for oral presentation, either to an empty room or to a long-suffering wife or chum, helps wonderfully in showing up weak points that should be eliminated and strong points that should be emphasized.

"Such a rehearsal also enables the speaker to make a fairly accurate estimate of the time necessary for presentation, and to avoid the shutting-off of a strong conclusion by the red light or the chairman's gavel. The writer has been a reasonably attentive member of many audiences, and he has yet to find one which is not rather kindly disposed to a speaker who errs on the side of brevity. Moreover, it is here asserted, positively and dogmatically, that no audience is pleased or greatly benefited by a speaker who reads to the desk rather than to the audience, or who cannot be heard clearly and without strained attention."

WHEN?

THE stylists of the nation have swooped down on rayon and taken it unto their bosoms. Retail merchants and the shoppers and modistes of the land are now taught that rayon apparel is "the fashion." Two style shows have been sent on the road by the Rayon Institute to tour the East and West and stage splendid displays in the department stores. The Institute comprises six of the principal American rayon manufacturers.

When will the rayon industry decide to give more attention to the technical properties of their synthetic fiber? When will rayon manufacturers open their eyes to the need for closer co-operation with the dyers of their product? If those who make and sell rayon yarns believe they can establish their product *permanently* in the favor of the American consumer solely on the basis of its style, they are due for a sad disillusioning.

The public demand for fast-dyed goods will not confine itself to cotton and silk. Any experienced dyer who has handled any quantity of rayon knows that faulty dyeing or finishing will eventually undermine public faith in goods containing the synthetic fiber. It is readily granted that style and beauty are important as a sales appeals; but *serviceability* has lately become the by-word of a more discriminating public. To make rayon garments more serviceable they must be the product of intelligent co-operation between those who produce the fiber and those who process the fabric. And that co-operation must involve the scientific study and improvement of rayon's dyeing properties, both when the fiber is used alone and in mixtures.

MR. WHITE'S INVITATION

WHEN workers in any trade or profession gather for a meeting most of them are sure to "talk shop." This will hold true even though the gathering is primarily for pleasure, such as an outing or a dinner. For a man's interest in his daily work will always show itself when he is conversing with others in the same occu-

pation—the golf match, the dinner or the after-dinner jokesmith will not hold any normal man's attention as long as some friend's personal "shop talk."

This deep interest people have in the experience of others in their vocation extends even to their reading. Baseball players are sure to be interested in anything Babe Ruth says about batting; aviators like to read Lindbergh's own story. But they also enjoy reading the adventures of far less famous flyers. It is a rule of human nature and it largely explains why most readers of THE REPORTER are interested in our column, "The Dyer's School of Experience." Every alert-minded dyer and many a mill chemist undoubtedly finds something uncommonly interesting and instructive in these true stories of others engaged in the same kind of work.

In this issue Noel D. White, the original founder of the "Dyer's School" makes an appeal for more contributors. We agree with him that there must be hundreds of mighty interesting stories shut up in the memories of Mr. White's fellow dyers; and almost every one of these dyehouse experiences, if published, would find interested readers among those who subscribe to THE REPORTER.

It is a poor rule that will not work both ways. If a dyer or chemist enjoys reading about the problems and trials of others in his trade, surely those others would be equally sympathetic in listening to the tale of his woes and triumphs. And to write about one's past experiences is merely to "talk shop" and therefore much easier to do than most people think. We hope many will respond to Mr. White's invitation.

TO HELP WORKERS

EVERYONE knows some word or phrase that has lost the original force of its meaning because it has been overworked. The word "quality," for instance, has been so abused that to-day it is avoided by careful advertising writers. But the *ideas* back of worn-out words never lose force. The idea behind that trite phrase, "Safety first," will always be of tremendous import to every human being, despite the fact that the phrase itself has been worn thin by use.

Several thousand men are gathered this week in the convention rooms of five New York hotels to discuss the momentous problem of cutting the accident rate in the nation's industry, as well as on our public streets and in our homes. It is the annual National Safety Congress. Its problems are everyone's problems. The discussions deal not with theories but with practical methods of preventing accidents in specific industries—accidents from which nobody but those in the graveyard are immune. All dyers and chemists and all others employed in the textile processing and chemical manufacturing industries can do their bit to help these safety experts to reduce industrial hazards. How? By obeying the safety rules that are in force in all well-managed plants. For these rules were formulated not only to protect the careless, but to help all workers to help themselves and others in the preservation of life and limb.

EXTRACTORIALS

When other industries have shown us the path to prosperity . . . why do we continue to lag behind? What scientific research has done for other industries it can also do for ours!—*Advertisement of the Woolen Corporation of America.*

Any company which does not adopt a policy of research in its business may as well set the date of its liquidation. I believe that in research is the answer to competition that is increasing every day. We find it is our best weapon, both for defense and offense.—*Charles Belknap, president of the Merrimac Chemical Company.*

When we think of chemistry and world progress our minds travel almost automatically to the factory, and are disposed to dwell on the chemist's industrial achievements, for we are confronted with them on every hand. Even the noisy traffic of the city is a continual reminder that raw materials come from the uttermost parts of the earth to the chemical factories.—*Sir James C. Irvine before the Institute of Chemistry.*

Millions of American consumers are entirely attracted to fabrics in the piece, in suits, overcoats, dresses, cloaks, sweaters and in dozens of household luxuries and necessities, by design and finally by the coloring and finish of that design.—*Fiber and Fabric.*

You can place in a mill the finest piece of machinery ever made, but by itself it cannot mercerize a piece of goods. At the same time, color cannot be produced by simply making a barrel of dyestuffs and standing it in the dyehouse along with the necessary chemicals. It requires the skilful use of the experienced man to obtain the results.—*D. C. Newman in Silk.*

From being considered an enemy and a competitor of cotton, wool and silk, rayon is fast taking the place of a helper. Fabrics are being created from mixtures with other fibers, which are pronounced more beautiful and more artistic than fabric heretofore produced from any one of these raw materials. The greatest change has come about in the products of the cotton mills and a large percentage of cotton fabrics are now made more attractive to the buyer through the introduction of rayon figures, bars and stripes.—*Franklyn Hobbs.*

The past summer has given convincing evidence of business recovery and few persons now have any doubts about business being good this fall. One industry after another has been falling in line with the better trend, so that while some unsatisfactory spots can still be found, general business is unquestionably getting back rapidly

to a normal footing. Again the country's recuperative powers have been underestimated, and revival has come more swiftly and vigorously than even the optimistic had anticipated.—*Letter of the National City Bank.*

The scientist who is called upon to provide the deadly explosives of the shell also makes the drugs and anesthetics which help and heal, and during the World War he had to solve the problem of giving protection against gas poisons as well as provide means of swift retaliation. —*Sir James C. Irvine.*

RECENT LITERATURE

A Standard Work on pH

The Determination of Hydrogen Ions. (Third Edition.) By William Mansfield Clark, Johns Hopkins University. Baltimore: Williams & Wilkins Company. Price $6.50.

Hydrogen ion tests and controls may be entirely familiar to scientists, but their application to industry has brought out the fact that plant chemists are only beginning to realize the possibilities of the pH method of determining acidity and alkalinity. The successful application of hydrogen ion control to numerous industrial processes has led to greater interest in the literature on the subject, and those who have pushed their inquiries beyond the elemental stage have invariably found Dr. Clark's book of greatest value.

The third edition of this relatively popular treatment of the subject should be heartily welcomed among the ranks of younger and more enterprising chemists who are alert to the latest advances in their profession. They form the group whose experiments with hydrogen ion control in its application to industry have thrown the spotlight of wide publicity on the method and have succeeded in bringing it to the attention of those industries, such as the textile and dyestuff industries, in which it has proven so useful.

The new edition is actually more elementary in respect to the needs of to-day than was the original work in relation to the needs of its day. The author says:

"While I have tried to avoid so far as possible discussion of the less significant instances, I conceive it to be the function of this book to tell about a few of the more important matters in terms agreeing essentially with those which the reader will have to know in his study of the literature."

Plant and mill chemists who have postponed the study of hydrogen ions until a more readable textbook appears may find what they seek in this third edition of a work so authoritative in its chosen field as Clark's. The volume is illustrated and contains an improved color chart of indicators, a bibliography, appendices and an index and comprises some 700 pages of text.

Patent Knowledge

Patents—Law and Practice. By Oscar A. Geier. Fourth Edition. 48 pages. New York: Richards & Geier.

The number of chemists and dyers who turn inventors and take out patents for formulas and processes grows steadily. The need for carefully protecting one's invention against infringement becomes more obvious with every new patent suit to defend the inventor's rights.

This little book costs nothing but it may save thousands of dollars. It contains a complete digest of patent laws and practice, outlines procedure in the patent office, defines interferences, reissues and appeals, explains the nature of infringements and gives many other pertinent facts about patent legislation and practice not generally known. No words are wasted in covering the subject, and this concise treatment adds to the clarity of the exposition. Every technical man who has ever patented a process or formula or who intends or hopes to patent something should inform himself on the fine points of the law by a perusal of this book. Copies may be obtained from the publishers without charge.

Solubilities of Compounds

Solubilities of Inorganic and Organic Compounds. Volume II. By Atherton Seidell, Ph.D. 576 pages. New York: D. Van Nostrand Company. $8.00.

This volume, like Volume I, is a compilation of quantitative solubilities from periodical literature and is a supplement to the second edition containing data published during the years 1917 to 1926, inclusive. While it is supplementary, it contains so much new and additional material that it appears to be quite indispensable to anyone who has found extensive use of Volume I.

The work covers all of the knowledge that is generally considered as related to solubility phenomena. It includes not only such facts as solubility in water and various organic solvents, but in addition reciprocal solubilities; data on binary and ternary mixtures; the distribution of solids, liquids and gases between immiscible solvents; equilibria between compounds represented by freezing point constants; equilibria in various systems; solubility of gases and liquids in liquids, solids in liquids, mixtures of solids in liquids and solids in mixtures.

There is no question in the minds of the author and publisher that a single book containing all quantitative solubility data arranged in alphabetical order would be more convenient to use than separate volumes containing the older and more recent results. The additional cost of such a complete volume would have been excessive and the owners of the second edition would have been

forced to purchase a book 60 per cent of which they already possessed. After careful consideration it was decided that the disadvantage of having to search in two volumes for a particular result was not sufficient to warrant a completely revised third edition. In order to overcome as far as possible the inconvenience of two volumes the author has included a subject index common to both, at the end of the present work.

The author has had available the excellent libraries of the Hygienic Laboratory and of the Department of Agriculture at Washington and the Pasteur Institute in Paris.

The two volumes taken together are very complete and the solubilities of many compounds are given which one would scarcely hope to find in such a compilation. They should prove of great value and save research workers many hours of laboratory work and literature research. L. A. O.

Industrial Chemicals—Their Manufacture, Properties, Shipment and Uses. Third Edition. 147 pages. Illustrated. Boston: Merrimac Chemical Company.

The competition among folders, booklets and other advertising literature is terrific these days; and, sad to relate, to the waste basket belongs most of the spoils. But this little gem of a book just issued by the Merrimac Chemical Company is not the kind that anyone will carelessly throw away. Even those who find in it nothing of interest to them will want to keep it on their desk because it looks so very readable. It fits the hip pocket and the rear pages are left blank for formulas and notes.

But most of the contents are almost sure to be read by all who use industrial chemicals. The foreword is an extract from an address on "Chemistry, Servant of Industry," by Francis J. Curtis, in charge of technical service of Merrimac.

There is a history of the company, a statement of its policy and other text of interest to customers. But most of the book is properly devoted to brief but informative descriptions of the chemicals made by Merrimac. A chapter on containers and the shipment of chemicals contains information of value to those connected with the distribution branch of the chemical industry, and parts of this section will be helpful to users of chemicals. Tables of specific gravity and atomic weights for various chemicals are included, and the book closes with advice on the treatment of chemical burns.

Whitehead Silks, Inc., Harrisburg, Pa., is the name of a company formed by George and William C. Whitehead, of Harrisburg, to operate a silk mill. Location of the plant has not been announced but it is reported that the building formerly occupied by the Harrisburg Shoe Manufacturing Company will be selected. The company is capitalized at $50,000. William C. Whitehead is treasurer of the company.

FRANKLIN PROCESS COMPANY INSTALLS LARGEST YARN DYEING MACHINE FOR COMMISSION DYEING

THE increased use of color in recent years has made mass production a necessity in commission yarn dyeing just as it has long since been a necessity in many other industries. The necessity has arisen because of the fact that many colored cotton fabrics are to-day made with solid ground either in the warp or filling or both. All the ends in such a fabric must be from the same dye batch to assure perfect goods.

A similar problem is encountered in dyeing yarn for multi-colored pile fabrics. The colored yarn used for the pile of such fabrics runs into very large poundage at times and here again all the yarn used in one piece of fabric must be from one dye batch.

It is true that a large quantity of cotton yarn of exactly the same shade can be produced by dyeing the fiber in the raw stock. However, this is not the real solution for many mills to-day, due to the fact that time is such an important factor in to-day's market. In other words, it takes the mill too long to get the yarn after ordering, due to the fact that the yarn has to be spun after the raw stock is dyed. Furthermore, yarn made from dyed stock has to be purchased in such large quantities that there is considerable risk in carrying it, especially in this age when styles and the popularity of certain colors change so rapidly.

The real solution seems to be larger yarn dyeing machines, and in response to an insistent demand from its customers the Franklin Process Company has built and installed two such machines, one in its Providence plant and one in its Philadelphia plant.

These machines will dye from 2,000 pounds to 3,000 pounds of cotton yarn per batch. They operate on the well-known Franklin Process principle, that is, they dye the yarn in the package or wound form. Two thousand Franklin packages with a six-inch traverse (approximately one pound of yarn to a package) can be placed in a machine at one time or 4,200 packages with a three-inch traverse (approximately one-half pound of yarn to a package).

These machines are built with twin dyeing kiers to facilitate loading and unloading. It has been discovered already that these large machines can do perhaps even better work than the smaller Franklin Process machines. This is no doubt due in part to the fact that the machines are equipped with unusually large and powerful pumps which effect an unusually thorough distribution of the dye liquor and perfect penetration of the cotton fiber.

This latter feature is particularly important to plush manufacturers as it enables them to make a pile of deep, rich color and with an unusual amount of luster.

Acme Finishing Company, Pawtucket, R. I., has secured a permit for a one-story 25 by 40 foot addition to its filter plant on Front Street.

PRACTICAL HINTS ON THE PRODUCTION OF BRIGHT COLORS

(*Continued from page* 630)

by printing the lightest shades with thin lines, the medium with thicker lines and the dark with filled stripes. In this way the design contributes also in the production of the effect, a contrast being introduced in the cases where the ombre effects are double; that is, where the darkest shade is in the middle, and the different gradations of color follow on both sides until reaching the lightest, by continuing the arrangement all through the goods, or using it as indicated on the right of the deepest shade and bringing the thinner lines in the gradations immediately following this, the medium intensity lines in the medium shades and the filled stripes in the lightest gradations.

The thin lines can be placed between stripes of short width, in all the different gradations of the ombre effect, or only in a part, greater variety being introduced by allowing intermediate white or differently colored spaces, printing over designs, etc. Ombres can be printed with filled stripes down the length of the cloth, and printed over across the wefts with ombre effects produced with thin lines in a lighter color, and here a large range of special patterns is possible.

Ombres with Three or More Colors

Ombres with three or more colors are seldom produced, owing to the large number of engraved rollers required, and high cost encountered in their incision, although quite a large series of fine articles would be possible through their means. In this instance several ombre effects can be printed having a different color and placed one after the other, the national colors often being reproduced in this way. The stripes are run either across the width or down the warps.

With other articles the effect can be given the appearance of the spectrum, causing the ombre to start with a light yellow which passes later to an orange, to a red, a violet, and gradually to a black, the pattern being among the most beautiful produced. In this instance the effect is of greater value when it occupies a certain amount of space and runs in preference down the piece, as here the different changes from one color to the other can be performed better, and the effect is more imposing. To render the pattern more brilliant the different stripes employed can be furnished with small shading lines, the points of passage from one color to the other being arranged for, showing no demarcation line. Besides this, when the darkest color has been reached, this can be followed by the next darkest and so on until reaching again the lightest, which would meet the lightest shade of the next ombre effect. By this arrangement double ombre effects would be produced continually down the pieces of cotton cloth.

Other ombre effects of great beauty are possible when employing several colors. With one of these, while producing the ombre across the width, colors would be chosen for producing also an ombre down the length of the pieces. Thus as a first ombre a black would be used, as a second, a violet, a third, brown, a fourth, orange, continuing after this again with the brown, the violet, the black again with the violet etc.

Special ombres can be produced by printing a base ombre in one or two or more colors, and passing over this with designs in contrasting colors that form in themselves a sort of ombre down the stripes of the first. Thus for the ground ombre a medium pink prepared with Rhodamine B could be employed with the simplest effects, printing above the stripes containing the different gradations of this thin transversal lines that are at first yellow and then orange, brown and black.

Brilliant Design Effects

Very bright designs can be printed on cotton fabrics with the basic colors where the beauty of the dyestuffs themselves is enhanced further by the adoption of special printing processes. Thus a very bright pink is produced with the following color paste prepared by dissolving 5 parts of New Methylene Blue N in 195 parts of water. The resulting solution is then allowed to cool, adding after this 200 parts of a solution containing 1 part of albumen and 1 part of water and 600 parts of a starch thickening.

The thickening is prepared by making 230 parts of wheat starch into a uniform paste with 1,410 parts of water, and incorporating 200 parts of a 6½% tragacanth mucilage and 160 parts of acetic acid at 6° Be.

After the printing the goods are dried and steamed for one-half hour, being then dried without washing.

A quite large number of effects are possible, such as:

1. The thin-line effects.
2. The stripe effects.
3. The extra bright effects.
4. The special design effects.
5. The bright flower effects.
6. The bright fruit effects.
7. The bright effects on cotton flannels.
8. The damask imitations, etc.

The thin line effects have taken a larger development than could have been imagined, and through the same quite a large range of articles are produced at present. One of these is indicated in the accompanying illustration (Fig. 1, page 629). Dotted lines of a certain length that break off at intervals are alternated by less numerous but much darker lines of greater thickness, and in different positions. In some articles a certain brilliance is attained by white spaces containing flowers, geometric designs, circles, fruits, small animals, etc. The printing rollers employed in this case are easily engraved. If not of proper material they can, however, be damaged after a comparatively

short period of use. The dotted lines are either all of the same color or of two or more colors, and their distance apart is also varied. The thicker lines are generally black, dark brown, dark violet, dark green, dark blue or other dark or medium colors which generally contract very markedly with the dotted lines.

(To be continued)

PLEDGES AID OF LABOR IN NATIONAL WAR ON ACCIDENTS

THAT organized labor is a convinced believer in organized accident prevention work was pointed out by John Sullivan, president of the New York State Federation of Labor, at the Seventeenth Annual Safety Congress, which opened in New York on Monday. He said, in part:

"It is impossible to conceive of any person having more interest in industrial safety than the employee. The entire hazard of workplace danger faces him or her. When the disaster comes it is the employee who receives its first and fullest impact and who is the last to recover from its evil effects. This is an elementary fact quickly driven into the consciousness of those who must earn their bread by the sweat of their brows. Within the factory and in the underground trades the frequency of accident, notwithstanding the greater opportunity for control of ways and means, usually keeps the possibility of disablement before the worker. Long contact with impending danger sometimes creates the indifference which leads to the careless act that invokes injury and death.

"Thoughtful workers are keenly aware of and fully estimate all of these hazards that surround them in their employment and seek by individual action and by collective action to minimize them. They suggest and concur in shop rules that make for safety, and in their organized capacity propose legislation to make ways and means compulsorily safe by law. It will not be disputed that the interest of the organized workers in the safety of all workplaces is chiefly responsible for the laws and codes now operating to safeguard workers in all occupations affected with danger to life and limb. Yet, notwithstanding all this desire to prevent and effort to limit, it is acknowledged that industrial accidents are still common happenings and the army of the crippled and widowed and orphaned is being added to every day.

"Any continuous period of experience with workplace accidents and of genuine effort to reduce the most apparent causes teaches us that vigilance must be constant if results are to be gained and maintained. In fact, there are no absolute methods of accident prevention that once devised and set in motion self-execute their humane mission.

"No one any longer accepts workshop accidents as inevitable. At one time they were considered as acts or omissions of a Divine Providence. Now we are coming to recognize clearly that many of them are due to human improvidence. A particular accident at its first occurrence may involve no personal fault, but its recurrence in the same workplace usually does. Where the fault is originally in the ways, works or machinery, its recurrence is plain negligence and thus becomes personal fault.

"Without inquiring as to whether personal fault is attributable to either an employer or to an employee in any given instance, we can all join in the conclusion that personal fault can and should be corrected and stay corrected. Such a correction is a task of co-operation, and such corrective co-operation is a mutual duty."

COTTON PRODUCTS COMPANY APPOINTED SALES AGENT FOR FRANKLIN RAYON

Outside of New England

The Cotton Products Company, with headquarters in Philadelphia, has for some months been acting as selling agent for the Franklin Rayon Corporation in Pennsylvania and has also been representing the Franklin Rayon Corporation in the hosiery and knitting trade in all sections of the United States outside of New England, New York City and New Jersey.

From now on the Cotton Products Company will represent the Franklin Rayon Corporation as general sales agent in all sections of the United States outside of New England and New York State (exclusive of New York City and Long Island) in all branches of the textile industry. The rayon department of the Cotton Products Company will be under the management of Carleton S. Francis, Jr., who was formerly assistant treasurer of the Special Yarns Corporation.

David Segal, formerly of the Sea Gull Yarn Company, New York City, has for some time past represented the Franklin Rayon Corporation in New York City and New Jersey. Mr. Segal has become associated with the Cotton Products Company and will continue to handle the same territory from the New York office of the Cotton Products Company.

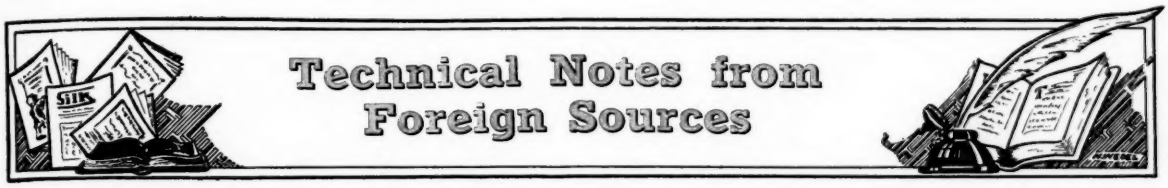
ENGLAND IMPORTING MORE DYES

Though Home Production Increased, Says Report

While the British production of dyestuffs in 1927, at 39,551,756 pounds, showed an increase of 9,254,756 pounds, or 30 per cent over 1926, the import licenses for dyestuffs granted during the same period showed an increase of 757,769 pounds, states a report by Trade Commissioner Homer S. Fox, London, issued by the Chemical Division as Special Circular No. 218.

The average price per pound of imported dyestuffs, excluding alizarine and synthetic indigo, increased from 47.94 pence in 1926 to 52.23 pence in 1927, indicating that the demand for imported colors is for a considerably better grade than was formerly the case, and probably is not due to any increase in the general price level.

Copies of this report may be obtained upon application to the nearest district or co-operative office of the Bureau of Foreign and Domestic Commerce.



Azo Dyestuffs for Cellulose Silks

English Patent No. 281,410; *British Dyestuffs Corporation, Ltd., J. Baddiley, P. Chorley and R. Brightman.*—Artificial silks of the viscose type are dyed with dyestuffs obtained by coupling various amines, their homologues, carboxylic, or sulphonic acids, to 2-amino-8-naphthol-sulphonic acids, or their N-substituted derivatives. Further, these mono-azo dyestuffs may be diazotized and coupled to a second molecule of the same or a different diazo-component may be used for coupling to the mono-azo dyestuff. Thus, one dyestuff is prepared by coupling diazotized p-nitro-aniline-o-sulphonic acid to 2-phenylamino-8-naphthol-6-sulphonic acid (phenyl-gamma acid), and this dyestuff diazotized and coupled to alpha-naphthylamine. This dyestuff produces a bluish-violet on viscose.

Mordants

English Patent No. 283,281; *W. Carpmael and I. G. Faben-Ind. A. G.*—The basis for the mordanting process here proposed is phospho-tungsto-molybdic acid united with a fixing agent other than tannin. Such fixing agents are aliphatic and aromatic amines, phenols, thio-compounds, and substances containing alcoholic hydroxyl. Still others of the same nature are dextrine, starch, cane sugar, glucose, etc. For example, cotton is treated with a 1% solution of benzidine hydrochloride, squeezed and treated at 70° C. with a 1% solution of phospho-tungsto-molybdic acid solution. After thorough rinsing, it is dyed with the dyestuff obtained from tetramethyl-diamino-benzhydrol and dibenzylaniline-disulphonic acid. The clear violet dyeing obtained is of excellent fastness to light, superior to what can be obtained with a tannin mordant, and it can be still further improved by treating with a reducing agent after dyeing (in which case it may be possible to omit the use of a fixing agent for the mordant.

Developed Dyeing of Wool

English Patent No. 283,838; *J. W. Leitch & Co., Ltd., A. E. Everest and J. A. Wallwork.*—An application of the Para Red process (referred to in a paper previously abstracted in these columns). The padding solution consists of the arylamide of p-hydroxy-3-naphthoic acid dissolved in a neutral or slightly alkaline bath containing soap or other dispersing agent which is not harmful to wool. The fabric may contain other fibers except silk. After squeezing in any suitable way, the dyeings are developed either by passing through, or by printing with, diazo salts in solution or in paste. An example is given (laboratory scale): 8 g. soap and 1 g. caustic soda are dissolved in 200 c.c. of boiling water, 2 g. of 5-chlor-2-toluide of 2-hydroxy-3-naphthoic acid are added, and the whole boiled until clear. The solution is poured into a bath containing 2 liters of water at 30° to 35° C., 100 g. wool are entered, and worked for five minutes. Development in diazotized 5-chlor-2-toluidine (-2-amino-i produces a rose of good fastness.

Developed Dyeing of Silk

English Patent No. 283,347; *J. W. Leitch & Co., Ltd., A. E. Everest and J. A. Wallwork* (see preceding).—In applying the Para Red method of dyeing to silk, the danger of attack of the fiber by caustic can be avoided by using a padding bath containing the naphthols in solution (or dispersion) in neutral or slightly alkaline reaction, the bath containing soap, glycerine or Turkey Red oil. Thus, in the example given, 5 g. olein or stearin soap and 10 g. soda ash are dissolved in 200 c.c. boiling water, 1 g. beta-naphthol is added, and the mixture boiled until clear. This is added to 2 liters of water at 30° to 35° C., and the silk, 100 g., is worked in the bath for five minutes, then taken out, squeezed, and centrifuged. It is developed in a diazo-bath prepared by mixing 1 g. m-nitro-p-toluidine, 4 c.c. hydrochloric acid (30%), and 30 c.c. boiling water, pouring into 2 liters of cold water, chilling with ice, and diazotizing with 10 c.c. of 5% sodium nitrite solution. After ten minutes' stirring, sodium acetate, or a mixture of soda ash and sodium acetate, or 4 g. sodium bicarbonate, is added. Silk thus dyed takes a bright pink, of good fastness to washing, light, acids or alkalies.

In addition (English Patent No. 283,839) it is claimed that silk, either alone or in mixed weaves, either natural or artificial or both, can be dyed as above, by first padding in a soap solution containing the arylamide of 2-hydroxy-3-naphthoic acid, but no alkali, wringing, and developing in diazo-solutions either by bath or printing. The dyeings are level, bright, and of good penetration.

Combination of Sulphur and Ice Color Dyeings

English Patent No. 266,387; *I. G. Farben-Ind. A. G.*—The goods (cotton, vegetable fiber) are impregnated with the sulphur dyestuff in reduced form, and the second component of the desired azo-dyestuff, simultaneously in a mixed bath; i.e., the bath contains the sulphur dyestuff reduced with sodium sulphide or hydrosulphite or both, and also contains the second azo-component, in caustic soda solution. The goods are then passed into a diazo or developing bath of the first azo-component, when the ice color is produced, and at the same time the leuco-

compound of the sulphur dyestuff is oxidized to the dye form, both, of course, in the fiber (must not sufficient free nitrous acid be present in the developing bath to accomplish this oxidation of the leuco-sulphur-dyestuff-compound?). In the example given, 3 kilos of diacetacetotoluide (ortho), 4 liters of Turkey Red oil, and 9 liters of caustic soda solution (53° Tw.) are dissolved in boiling water and added to a bath of 1,000 liters of water, and a solution of 5 kilos of Immedial Green and 15 kilos of crystallized sodium sulphide in boiling water added. The goods, after treatment for one-half to three-quarters hour at about 50° C., are squeezed and developed in a bath containing 1.6 kilos of diazotized 2-5-dichlor-aniline and 2 liters of glacial acetic acid in 1,000 liters of bath. A brilliant yellowish-green is produced. Other suitable combinations are also given.

Stabilizing of Immunized Cotton

English Patent No. 283,672; *Courtaulds, Ltd., H. J. Hegan and J. H. Taylor.*—If goods, immunized with tannic acid-stannous chloride are afterwards treated with a weak alkali, such as soap or soda ash, the tendering action of the immunizing bath is entirely or at least largely obviated.

Vat Dyestuffs

English Patents Nos. 260,998 *and* 280,217; *L. Cassella & Co.*—In contrast to the claim of German Patent No. 287,250, the halogenation of anthanthrene (German Patent No. 280,787) by heating with bromine at 270° to 280° C. gives a worthless dull brownish red dyestuff. But valuable vat dyestuffs are obtained by halogenation at a lower temperature; for example, chlorination of anthanthrene suspended in trichlorbenzene at 150° C., or in sulphuryl chloride in presence of iodine at 60° C. (a yellowish-orange product) or bromination in nitrobenzene at 160° C., or in sulphuric acid in presence of iodine at 50° to 100° C. (reddish-orange product).

Or (2nd reference) the condensation mixture 1-1'-dinaphthyl-8-8'-dicarbonic acid and monohydrate, condensed to anthanthrene) may be halogenated directly, without isolation of the anthanthrene.

English Patent No. 265,232; *I. G. Farben-Ind. A. G.*—In addition to English Patent No. 237,294, two molecules of an ortho-nitroamine may be substituted for the ortho-diamine, the same being condensed with the dianhydride of naphthalene-1-4-5-8-tetracarboxylic acid by boiling in nitrobenzene, the ring being closed and the iminazole formed by reduction of the condensation product with sodium sulphide or iron and glacial acetic acid.

English Patent No. 265,964; *I. G. Farben-Ind. A. G.*—See the preceding. A mixture of an ortho-diamine and the dianhydride of naphthalene-1-4-5-8-tetra-carboxylic acid is boiled with alcohol, and the condensation product further condensed internally by heating to 150° C., or by boiling with glacial acetic acid. The product is a red vat dyestuff.

Immunized and Amidated Cotton

"D. R.," Faeber-Zeitung 54,564 (1928).—A colored or white effect can be produced on a weave that consists of ordinary and immunized cotton, by dyeing with direct or other dyestuffs which leave the immunized fiber uncolored. It is not easy, however, to keep white the immunized cotton in the case of deep shades, and it is practically impossible to attain a pure black-and-white effect. Two-color effects are obtained upon mixed weaves, by using the common direct cotton dyestuffs, which leave the immunized cotton untouched, and then after-dyeing the latter constituent with suitable dyestuffs; or one can dye the immunized constituent first. Three-color effects are attained upon mixtures of common, immunized, and previously dyed immunized, cotton; or by working with immunized cotton woven with other fibers, which possess different dyeing properties. There is an almost unlimited series of possible color effects, which can be obtained with immunized cotton, for fashion shades on wool, silk, linen, viscose and acetate silk.

Local immunization can be brought about upon cotton goods by printing with a thickened mixture of alcohol, caustic soda and para-toluene-sulphone-chloride, washing the fabric, and then dyeing with suitable dyestuffs which will give the various color effects.

Another interesting fiber related to immunized cotton is the so-called amidated cotton, which is the result of many experiments upon immunized cotton, and is manufactured from it. Ammonia has no effect upon cotton, but it has been found that ammonia, aniline and other amines do act upon immunized cotton readily. Ammonia apparently splits off the para-toluene-sulphonic group as the sulphonic acid and leaves in its place an ammodia radical. This product is called amidized or amidated cotton, and appears to be a compound made up of a cellulose residue of one or more molecules of cellulose, with an amino group. According to a patent of a Swiss firm, it is prepared commercially through treatment of immunized cotton with ammonia gas for one hour at 100° C., or for a longer time at a lower temperature. Different aliphatic amine or aniline can be used in place of ammonia, but the latter gives the best results. The product contains about 0.7% to 0.8% of nitrogen.

The properties of amidated cotton differ greatly from those of the immunized form. It has a very great affinity for direct cotton and for acid dyestuffs. It removes all the dyestuff from common cotton, which has been dyed with direct colors, if the two materials are heated together in water. On account of its dyeing properties it is suited for effect dyeings in the same way as immunized cotton.

Dyeing of Mercerized Cotton

Dr. H. ("Tiba"), Faerber-Zeitung, 54,564 (1928).—In general it is best to dye mercerized cotton, when possible,

immediately upon its leaving the mercerizing bath, for the fibers are then in the swollen condition and take up the dyestuff best. But if one has to deal with dried yarn it is absolutely necessary, according to Pierre Cuveleg, to wet out the yarn in boiling water, best with the addition of an approved wetting-out agent. In dyeing, it is well to begin in the cold and to add first to the water 1-1.5% of a wetting compound. The goods are well separated and the dyestuff solution then added gradually, in very small portions. The temperature should at this point generally not exceed 25° C. If necessary, for obtaining a level dyeing, the temperature can be raised to 30° to 40° C., but not higher. If dyeings are not even, the only resort is to strip at 90° to 95° C., with 1% of soda ash and 1% hydrosulphite conc., wring, treat with lukewarm 2% hydrochloric acid, wash, wring and redye. The following recipes are for 40 kilos of mercerized yarn:

Light Gray:
66 g. Benzo Fast Black NL.
36 g. Diazol Brown NCJJ.
0.4 g. Diazol Light Red N8B.

Light Peige:
110 g. Diazol Brown NCJJ.
26 g. Benzo Fast Black NL.
6.8 g. Diazol Light Red N8B.

Dark Gray:
990 g. Benzo Fast Black NL.
225 g. Diazol Brown NCJJ.
130 g. Diazol Light Red N8B.

For the last, 2 kilos of Glauber salt crystals are added toward the end. In dyeing the dark shades, some prefer to add the whole amount of the dyestuff cold, and then to heat to 70° C. The author, however, prefers to begin at the boil, but to add the dyestuff solution gradually in small portions [compare the first part of this! Tr.]. Some dark blues and some brown shades can be produced with sulphur dyestuffs, as well as blacks, and these dyeings are carried out in the same way as upon common cotton. [Original says "Wolle"; surely a misprint for "Baumwolle."] For blacks, besides sulphur dyestuffs, developed blacks are also much used. In regard to the use of sulphur dyestuffs, it is important to notice that these may give rise to the formation of sulphuric acid, which will of course tender the fiber. This can in any case be avoided by treatment, after dyeing and wringing, with soap and sodium acetate, with the addition of a little castor oil. Aniline black is still the most satisfactory, but it of course demands experience and care. Yet it may be pointed out here that mercerized cotton is much more resistant toward oxidizing agents than is ordinary cotton.

One of the most important forms of mercerized cotton consists of the so-called gauze stockings. They are either made from dyed yarn, especially if of bright colors, or they are dyed after knitting. This is not altogether easy, especially if they are of a fine grade. In any case, bleaching must precede dyeing. For this purpose, they are boiled for two hours in a solution of soda, with a little of some good soluble oil, during which the bath must be kept in a gentle, steady boil. Then a second boil follows, in soda solution alone, for a quarter-hour. The goods are taken out and rinsed in cold water, the soda baths being used for the next run. The boiled-out goods are now bleached by treatment for one hour in a cold sodium hypochlorite solution of 2° Be., then rapidly transferred to water and well moved about. This wash water needs to be changed only once, since possible traces of chlorine are removed by the subsequent boiling with soap. This soaping lasts about two hours, when the soap is removed by boiling with soda-ash solution and rinsing. A second mild bleach follows, for one hour, cold, in a 1% sodium hypochlorite solution, followed by a cold wash for one-quarter hour in a weak sour. Finally the goods are blued and the silk "feel" imparted. For blueing, a solution of Alizarine violet or, better, Indanthrene Blue RZ with a little ultramarine, is used. A trace of the blue is sufficient. It is dissolved in quite soft or distilled water, with a little cocoanut oil soap and sodium acetate. After blueing, the goods are treated with dilute acetic acid, to which a little aluminium acetate is added for the production of a good "feel." The "crackly silk feel" is produced by immersion of the goods in a hot (best, boiling) soap solution, letting drip off well, and treating with a cold solution of 2 to 3 g tartaric acid per liter. The goods are then squeezed and allowed to dry.

BELLMAN BROOK TO ADD PRINTING DEPARTMENT

The Bellman Brook Bleachery of Fairview, N. J., has drawn up plans for the addition of a printing department that will probably be in operation by October 15. The plant specializes in the finishing of voiles, organdies, batistes, lawns and sheer rayon fabrics.

The equipment for the new department, it was announced, will include three six-color machines and one eight-color machine. The announcement further stated that "All the printing equipment will be of the most modern type and will be under the expert supervision of a skilled staff, picked with the greatest care to insure the promise of a high quality printing service on sheer cottons and rayons.

"The open stock service that Bellman Brook renders can now be used to a full extent, as Bellman Brook's facilities thus will cover the full range of finishing, bleaching and dyeing, commercial and vat colors, as well as any form of printing.

"In the case of Bellman Brook Bleachery, this printing plant opens the opportunity for the further development and exploitation of several chemical finishes for which Bellman Brook has the right, such as permanent finished organdie, opal, diaphane, linen finish and permandy."

TEXTILE ENGINEERS PLAN GREENVILLE MEETING

Among the interesting features planned for the Southern Textile Exposition, to be held here October 15, is a special meeting of the Textile Section of the American Society of Mechanical Engineers. Every member is invited to attend. James M. Cox, chairman of the section, will preside and the principal address will be delivered by Alexander Dow, who has been a leading member for many years. Mr. Dow was elected president of the society at the annual meeting in New York last December. He will be accompanied by Fred R. Low, editor of "Power."

The huge two-story addition to Textile Hall has been completed. Many exhibits are arriving. The decorators have finished their work in the annex and are hanging festoons of bunting in the main building.

The management announces that 200 exhibitors are preparing the most interesting collection of cotton mill machinery ever seen in one place. The old established shops in New England have taken large spaces. Two of the exhibitors have contracted for 4,000 square feet each. Several others have reservations almost as extensive. Among the smaller exhibitors there are hundreds of interesting machines, articles of equipment and varieties of supplies. Everthing used in a cotton factory may be seen at the Southern Textile Exposition.

OAKITE TO DISPLAY AT GREENVILLE SHOW

Specimens of woolens, cotton goods, silks and rayon that have been processed the Oakite way will represent the major attraction at Booths 47 and 48 of Oakite Products, Inc., New York, at the Southern Textile Exposition, Greenville, October 15 to 19.

Samples of work upon which Oakite is used by mills in their wet-finishing operations will be exhibited to show the results in dyeing and other advantages obtained with this modern textile detergent. Both field and technical men will be in the booth to discuss wet-finishing operations. Carl Johnson, technical director; E. W. Klumph, district manager, Charlotte, N. C.; V. D. Smith, technical department; D. H. Hearn and A. A. Kopp.

NEW RESEARCH SPECIALIST AT NATIONAL OIL PRODUCTS

Dorothy Langdon Potter, A.B., M.A., has joined the Silk Research Division Laboratory of the National Oil Products Company of Harrison, N. J.

Miss Potter secured her A.B. degree from Barnard College and an M.A. from Columbia University. She was for several years with United States Rubber Company research laboratory, textile division, and for the past five years with the Schwarzenbach Huber Company research silk laboratory.

The acquisition of Miss Potter is the fifth research specicalist that has been added in the past few months to the laboratories of the National Oil Products Company

QUAKER CITY CHEMICAL COMPANY BUILDS SOUTHERN PLANT

Owing directly to the continued growth of the textile industry in the South, the Quaker City Chemical Company of Philadelphia, Pa., are now constructing a factory warehouse and plant in Knoxville, Tenn.

This plant and its sales force will be under the management of W. S. McMab, who has been their Southern representative for ten years. In addition to manufacturing sulphonated oils, rayon oils, softeners and dyeing assistants of all types, they will handle a complete line of chemicals for the textile industry and Pennsylvania lubricating oils for the O. F. Zurn Company, of Philadelphia.

The laboratory will be under the supervision of Mr. Robert Cowan, an experienced manufacturing chemist.

The company has been manufacturing products for the textile industry for forty-five years and have a branch plant in Hamilton, Ont., Southern warehouse in Chattanooga and Southern office in Knoxville, Tenn.

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i. e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

DYESTUFF SALESMAN

Experienced dyestuff salesman, well known by entire textile, leather, paper industries, etc., in territory covered by him for many years, offers his services to first-class manufacturing concern. A-1 references given. Address: Classified Box 466, American Dyestuff Reporter.

EUROPEAN AGENCY

Old, reliable German-Czechoslovakian concern of first-class standing and with best business connections in Germany, Czechoslovakia, Austria, Hungary, the Balkans, Italy and France, offers its services for the sale of **American raw materials, chemicals and dyestuffs** in Europe, on commission basis, or for own account. Brueder Drechsler, Pilsen, Czechoslovakia.

TEXTILE CHEMIST

Textile chemist and dyer wants steady position. Eighteen years' experience. Thoroughly competent in all lines of bleachery work, including art silk mixtures and vat colors. Can supervise development work or handle production. Address: Classified Box 475, American Dyestuff Reporter.

LABORATORY ASSISTANT

Wanted, by dyestuff manufacturer, assistant in application laboratory, experienced in testing of dyestuffs on paper and textiles. Give full details regarding experience, references and salary. Address: Classified Box 483, American Dyestuff Reporter.